

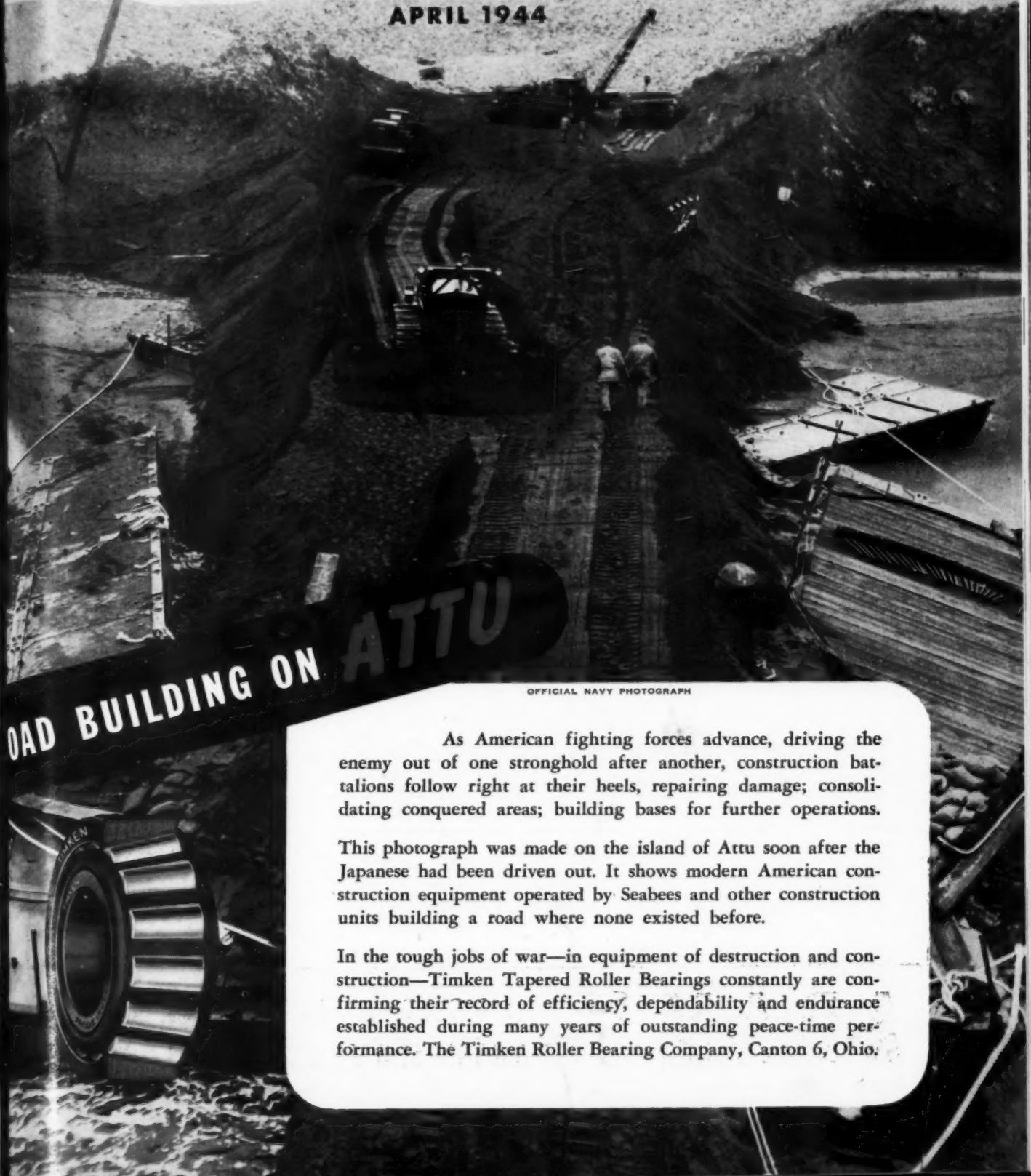
ROADS AND STREETS

APRIL 1944

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DETROIT



ROAD BUILDING ON ATTU

OFFICIAL NAVY PHOTOGRAPH

As American fighting forces advance, driving the enemy out of one stronghold after another, construction battalions follow right at their heels, repairing damage; consolidating conquered areas; building bases for further operations.

This photograph was made on the island of Attu soon after the Japanese had been driven out. It shows modern American construction equipment operated by Seabees and other construction units building a road where none existed before.

In the tough jobs of war—in equipment of destruction and construction—Timken Tapered Roller Bearings constantly are confirming their record of efficiency, dependability and endurance established during many years of outstanding peace-time performance. The Timken Roller Bearing Company, Canton 6, Ohio.

ADAMS MOTOR GRADERS

Pack Plenty of Power



One of a series of ads on Adams motor grader features

***TURNING** a capacity load of heavy oil-mix material at 3 to 5 m.p.h. (as pictured above) takes plenty of power . . . and traction . . . but Adams heavy-duty motor graders have what it takes. All models of Adams motor graders pack plenty of power for their size enabling you to get out of any model the capacity built into it. When you get into an extraordinary load the engine has the torque reserve or lugging ability to hang on where some engines would stall. The operator never experiences the feeling that his machine is under-powered . . . Incidentally the Diesel engines used in Adams motor graders are started easily in any kind of weather and

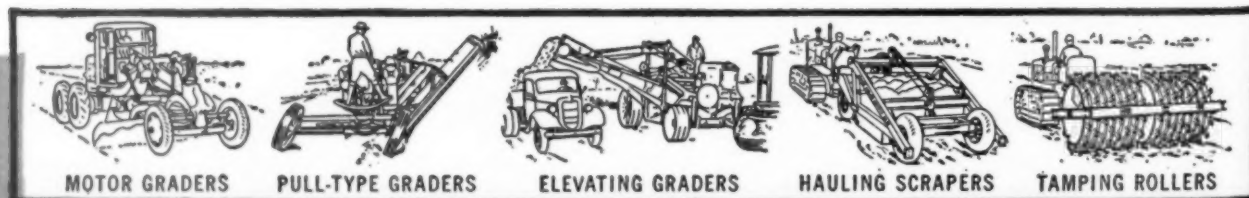
are very economical to operate and maintain.

Yes . . . their abundance of power, their long life, ease and economy of operation, their wide adaptability to all kinds of work . . . surface, ditch and bank . . . make Adams motor graders favorites among the several thousands of highway officials and contractors who own and know them. They will be your best buy when again you can purchase new machines. In the meantime, use the services of your local Adams dealer to keep your present equipment rolling.



J. D. ADAMS COMPANY • INDIANAPOLIS, IND.

Granted a second Army-Navy Production Award for continued proficiency in the production of grading machinery for our armed forces



MOTOR GRADERS

PULL-TYPE GRADERS

ELEVATING GRADERS

HAULING SCRAPERS

TAMPING ROLLERS

ADAMS

★ ROAD-BUILDING AND ★
EARTH-MOVING EQUIPMENT

How Simplified Wire Rope Practice Benefits the Consumer

Simplified Practice for wire rope—as defined in recommendation R198-43 of the National Bureau of Standards—has been in effect since February 15, 1943. The industry has whole-heartedly accepted this reduction in sizes, grades and varieties of wire rope.

The overall reduction is from 973 items to 643, or 33.9 per cent. In the four rope constructions which represent the industry's major tonnage, the reduction is from 352 items to 182, or 48 per cent. We think that simplified practice is proving its worth.

To the consumer, there are obvious benefits in simplification. In nearly all cases he will find a rope available that fits his needs, and in addition he will get quicker deliveries and better service.

So we say to wire rope users: Stick to simplified practice ropes. We'll be glad to help you solve your problems. And, of course, simplified practice does not preclude manufacture and sale of special-purpose ropes, such as those listed in our new Wire Rope Catalogue, No. 165. Write to Bethlehem Steel Co., Bethlehem, Pa., for a copy today.

THESE ARE THE 20 STANDARD TYPES OF WIRE ROPE LISTED IN VARIOUS GRADES IN R198-43

- 6 x 7 wire rope
- 6 x 19 wire rope
- 8 x 19 wire rope
- 6 x 37 wire rope
- 6 x 19 elevator rope
- 8 x 19 elevator rope
- 5 x 19 marline clad rope
- 18 x 7 non-rotating rope
- 6 x 12 galvanized running rope and hawsers
- 6 x 24 galvanized steel mooring lines and hawsers
- 6 x 37 galvanized steel hawsers
- 6 x 25 type "B" flattened strand wire rope
- 6 x 30 type "G" flattened strand wire rope
- 6 x 8 type "D" flattened strand wire rope
- 6 x 6 x 7 tiller rope
- 6 x 7 iron, bright, and galvanized sash cords
- 9 x 4 galvanized mast arm rope
- 6 x 19 marline clad grain-shovel rope flat rope
- 6 x 7 galvanized iron rigging and guy rope



ROADS AND STREETS

Vol. 87, No. 4

April, 1944



A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD
ROADS MAGAZINE AND ENGINEERING & CONTRACTING

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Telephone: Mutual 8812



SCORE
WITH McNAMARA CONST. CO.
Lorains 27

IT'S a fact! The McNamara Construction Company, Toronto, Ontario, has bought 27 Lorains—including shovels, cranes, draglines, and back-diggers. These Lorains were purchased at different times—over a considerable stretch of years.

Repeat orders, in volume like this, are not based on sentiment. They're based on past experience . . . on actual performance records of Lorains on all kinds of jobs, under *all sorts of conditions*. We think you'll agree that 27 "repeats" by a single company is pretty conclusive evidence of Lorain ability to work most any type of job—at a profit to the owners.

That's why—when planning your postwar equipment setup, you owe it to yourself to get the full story on Lorains from your Lorain distributor. There's one nearby. You may find that his recommendations will mean big money to you on postwar jobs that come your way. So, see him soon.

THE THEW SHOVEL COMPANY • Lorain, Ohio

Reg. Trade Mark
thew Lorain

DRAGLINES

CRANES • SHOVELS • MOTO-CRANES

Prepare for P

WITH AUSTIN-WESTERN

CRUSHING PLANTS



TWIN-UNIT PLANT

This Plant combines maximum output with the flexibility and portability that result from building it in two Units which, along with the conveyors that serve them, can be set at any desired angle with respect to each other.

A typical Primary Unit, for gravel, will have a 1036 jaw crusher; for quarry operation, the crusher would be a 2540. Material can be by-passed around the Secondary Unit directly to the bin. Sand can be removed at either the Primary or Secondary Unit. The Secondary Unit can be designed to produce all the way from one size to four sizes of material.

On an airport construction job, requiring both $1\frac{1}{4}$ " minus and $2\frac{1}{2}$ " minus, the Twin-Unit Plant at the job averaged 500 tons per hour for the entire job, crushing 25%. Such production records explain why more and more operators are building their plans for wider and more profitable operations around the Austin-Western Twin-Unit Plant.

C.E.P. CRUSHING PLANTS

C.E.P. (Crusher, Elevator, Power) Plants can be had with any size Austin-Western crusher; can be used alone, or incorporated into more elaborate Plants. The folding-type, bucket elevator delivers the crushed stone to a loading bin. The power unit is mounted on the same trucks as the crusher. Most sizes of trucks can be fitted with pneumatic tires.

The Austin-Western line includes various styles and sizes of belt conveyors, screens and bottom-discharge bins; all of which can be combined with crushers to produce practically any desired size and style of portable, semi-portable or stationary Crushing and Screening Plant.



Primar
model
the pre
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and com
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gravel
for env

ARMY
NAVY

Post-War Profits

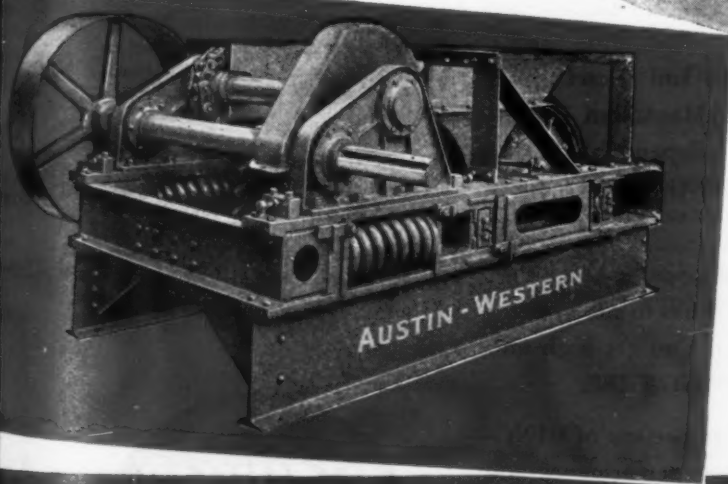
WITH AUSTIN-WESTERN

JAW CRUSHERS

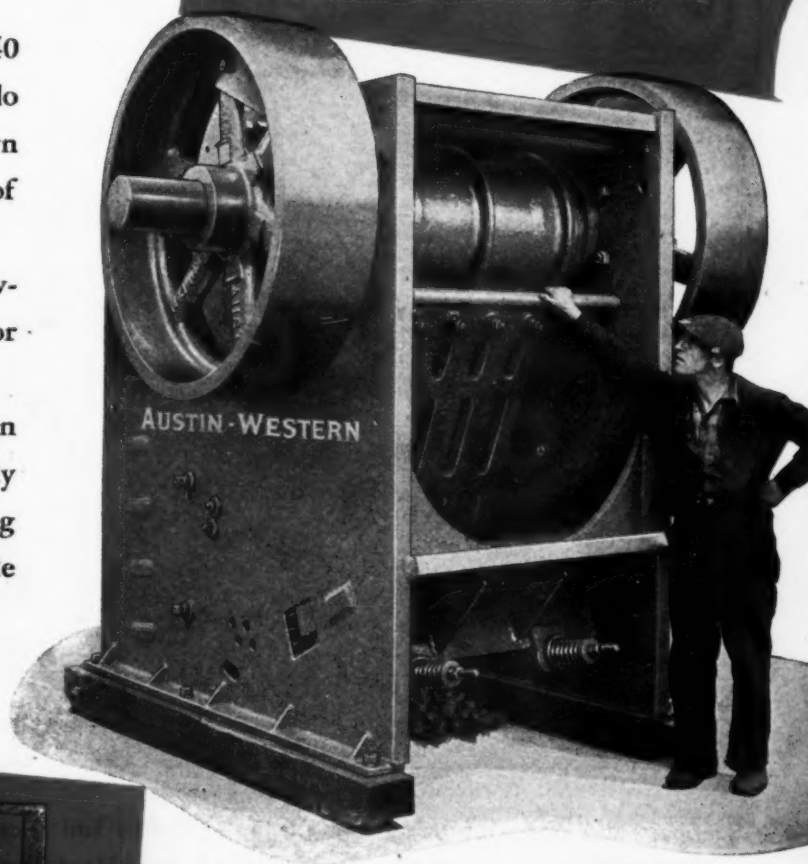
Primary Crushers, or "Breakers," like the 2540 model shown at the right, are called upon to do the preliminary breaking of large stone down to a size that can be handled by the balance of the equipment.

General Purpose Crushers are made in several sizes, and can be used in either quarries or gravel pits.

Austin-Western crushers have all the design and construction features that result from nearly 50 years of building equipment for handling gravel and stone—features that are responsible for enviable capacity and economy records.



JAW and ROLL CRUSHERS



ROLL CRUSHERS

This type of crusher is designed to take the stone after it has had its preliminary breaking, and reduce it to the smaller sizes of aggregate now so generally required.

Austin-Western Roll Crushers have many unusual and worthwhile features of design, including: SKF roller bearings, located inside the rolls; manganese steel shells; roller chain drive for the rolls, and counter-shaft for direct motor drive.

AUSTIN-WESTERN

COMPANY

Austin Western

AURORA,

ILLINOIS, U. S. A.

BUY MORE
WAR BONDS

The Austin-Western line includes: POWER GRADERS, ROAD GRADERS, ELEVATING GRADERS, ROAD ROLLERS, SHOVELS AND CRANES, STREET SWEEPERS, DUMP CARS, TRAIL CARS AND A COMPLETE LINE OF ROCK CRUSHING AND SCREENING PLANTS.

"..not one single shut-down with RING-FREE"



Strippers and other motorized equipment (gasoline and Diesel) give performance you're proud of when lubricated with Macmillan RING-FREE Motor Oil. They deliver more usable power—dependable power—under toughest operating conditions because RING-FREE reduces friction *fast!*

And Macmillan RING-FREE *removes* carbon while your engine runs! Changing to RING-FREE means getting a motor that has to run sweeter as it benefits fully from rapid, thorough penetration. You get high film strength, high heat resistance and long cling from RING-FREE.

Macmillan representatives welcome your trial and comparison of RING-FREE on the basis of complete records of operating performance and economy!

MACMILLAN PETROLEUM CORPORATION

50 W. 50th Street, New York 20 • 624 S. Michigan Avenue, Chicago 5 • 530 W. 6th Street, Los Angeles 14
Copyright 1944, Macmillan Petroleum Corp.

Quoting the WILMINGTON COAL MINING CORP., Morris, Illinois: "...through dust, sand and mud in all sorts of weather, operating 24 hours a day in 3 shifts—we have not had one single shut-down as a result of stuck rings or valves, since we adopted RING-FREE. We have proven in this extremely difficult operation that RING-FREE'S ability to penetrate rapidly to tightly fitted valve stems and rings and to resist high temperatures, as well as the sludging effect generally caused by cold weather work, places it far above any lubricant we have had before."

**MACMILLAN
RING-FREE
MOTOR OIL**

REDUCES WEAR BY REDUCING FRICTION

Congratulations
to
PRESIDENT-ELECT
G. W. VAN KEPPEL
and the
ASSOCIATED EQUIPMENT DEALERS



The election of G. W. Van Keppel, as President of AED, at Silver Anniversary Convention in Chicago, is not only a deserved tribute to a most popular AED member, but it places in this high position another sound leader in equipment at a most important time when ALL must plan and work soundly together for the future of highways after the war. Planning for post-war highway construction will be the most important in history and in this the Equipment Dealer will be a most important factor.

G. W. Van Keppel has been an Etnyre dealer for 10' these many years and he has sold many Etnyre "Black-Toppers" which are giving unequaled service in the application of asphalt, tar, road-oils and emulsion in road, street and airport construction, re-building and maintenance . . . not only in U.S.A., but in all parts of the world, as the U.S.A. Army, Navy and Allies chose Etnyre-"Black-Toppers" to build military roads, airports, flight-strips, wherever the war is being fought.



A New Booklet . . . FREE TO ALL

. . . a guide in post-war planning . . . send for your copy now.

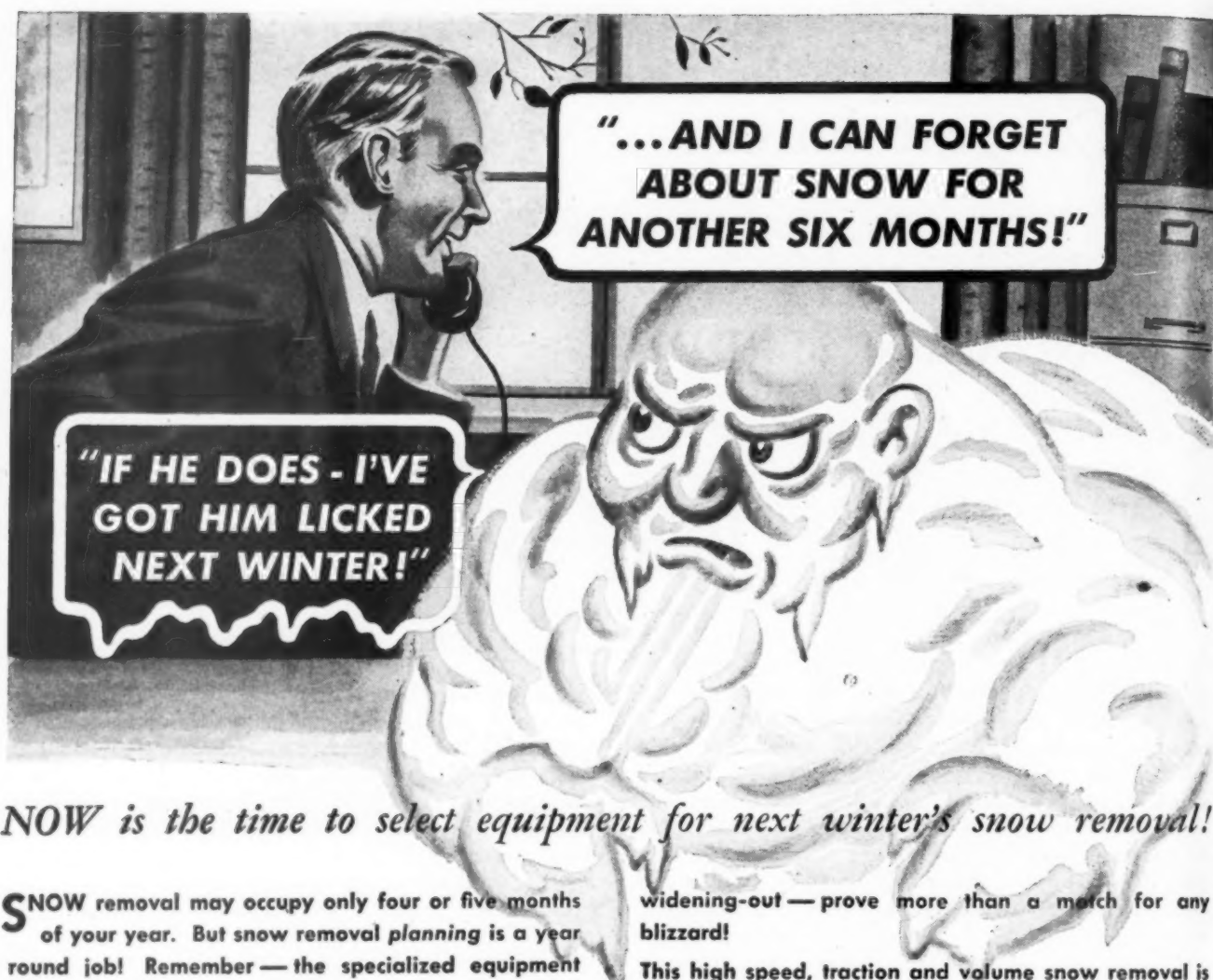
"ROAD-BUILDING IN U.S.A." is our contribution to post-war planning of highways, streets and airports. Contains data valuable to all who are interested in future of construction projects after the war. Widely acclaimed by many outside of highway industry and trade—especially highway-users—the taxpayers who must vote the appropriations, etc., for the construction program ALL of us want to see happen after the war. Send for your copy now . . . read it; then please tell us what you think of it.

Copies of this booklet may also be had from your Etnyre Dealer

ETNYRE "Black-Topper"

The Most Widely-Used Bituminous-Materials Distributor in the World

OREGON, ILLINOIS, U. S. A.



NOW is the time to select equipment for next winter's snow removal!

SNOW removal may occupy only four or five months of your year. But snow removal planning is a year round job! Remember—the specialized equipment needed for highway snow clearance cannot be evaluated, ordered and manufactured on short notice.

When you're considering additions to your snow removal fleet, study the outstanding records for snow-free operation on highways patrolled by Walter Snow Fighters. These rugged, powerful units smash through road-blocking drifts—hurl snow far to the side—speed

widening-out—prove more than a match for any blizzard!

This high speed, traction and volume snow removal is made possible by Walter Four-Point Positive Drive. Power is proportioned to each of the **FOUR** driving wheels according to its traction at any instant. There is none of the wheel-spinning, slipping and stalling that result from wasted power in rear-wheel and conventional four-wheel drive trucks. Your first step toward more efficient snow removal next winter, is to get the facts on Walter Snow Fighters, today!



WALTER
SNOW
FIGHTERS

WALTER MOTOR TRUCK COMPANY • 1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L. I., N. Y.



Make rivers
do their own reclamation work
with
PRESSURE-TREATED WOOD

This picture shows how one engineer has turned the tables on destructive floods.

The pressure-treated timber groins not only protect the embankment against further erosion . . . but the action of the water against the groins is expected to bring in silt and *rebuild* the banks to their original position. Since this installation was made, contracts have been awarded for 17 additional groins.

Total length of the groins illustrated is 104 feet. Each one projects into the water 40 feet at normal stage. All material was pressure-treated with creosote, to a net retention of 12 pounds per cubic foot.

Every engineer knows that right today there is a tremendous back-log of badly needed erosion control jobs, that have been deferred by the war. These will

be reinforced by hundreds of new projects, already blueprinted in post-war plans. Pressure-treated wood is an ideal material for construction like this.

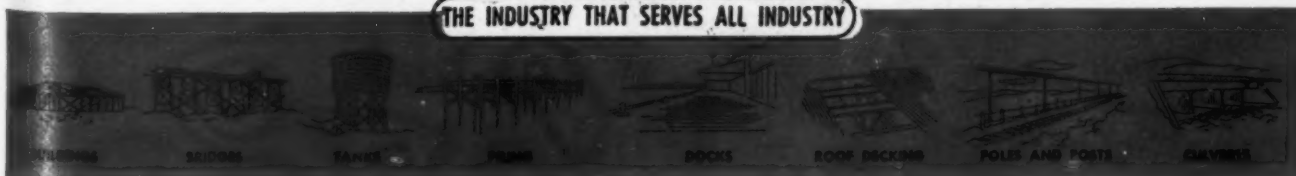
Pressure-treated wood makes substantial savings in first cost. In one large similar project, the engineer reported that pressure-treated wood construction cost from 16 to 33% less than quotations on other forms of permanent construction. The treatment gives dependable, long-time protection against decay and other destructive agents, and little or no maintenance is ever required. Installation is simple and rapid, and structural modifications to meet unexpected conditions can be easily made on the job.

We will be glad to give you details on the use of pressure-treated wood for groins or jetties . . . or any of the hundreds of other applications where it is serving and saving. A number of these installations are illustrated in our bulletin, "Economical and Permanent Construction with Pressure-Treated Wood." Would you like to have a copy? Just write.

KOPPERS COMPANY • WOOD PRESERVING DIVISION
PITTSBURGH (19) PA.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY



ROADS AND STREETS. April, 1944

MR. 6x6'S PERSONAL PHYSICIAN!

● When a soldier's job is to keep Uncle Sam's motorized equipment rolling through the battle zones, he learns all the practical know-how there is in the book — plus a lot more that can't be put into books. It's an assignment that carries life-or-death importance.

Some great day (soon, we hope) these young men will be back seeking to put their knowledge and experience to

peacetime use. Wise and fortunate will be the employers who make the most of them!

Our reputation today rests with Army men, and we will gladly rest our *postwar* case on their expert judgment of Ward LaFrance trucks.

† † †

Ward LaFrance's wartime assignment includes heavy wreckers for tank-recovery work, as well as fire apparatus for Army, Navy, and essential civilian needs. Peacetime manufacturers of fire apparatus, commercial dump trucks, plows, cranes, gas and Diesel over-the-road tractors.



WARD LaFRANCE

TRUCK DIVISION, GREAT AMERICAN INDUSTRIES, INC.

ELMIRA



NEW YORK

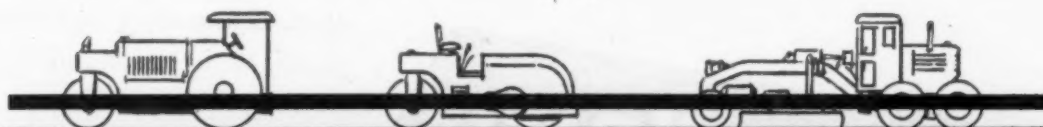


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GALION



ROAD ROLLERS • MOTOR GRADERS • SPREADERS
TOP PERFORMANCE — IN WAR OR PEACE

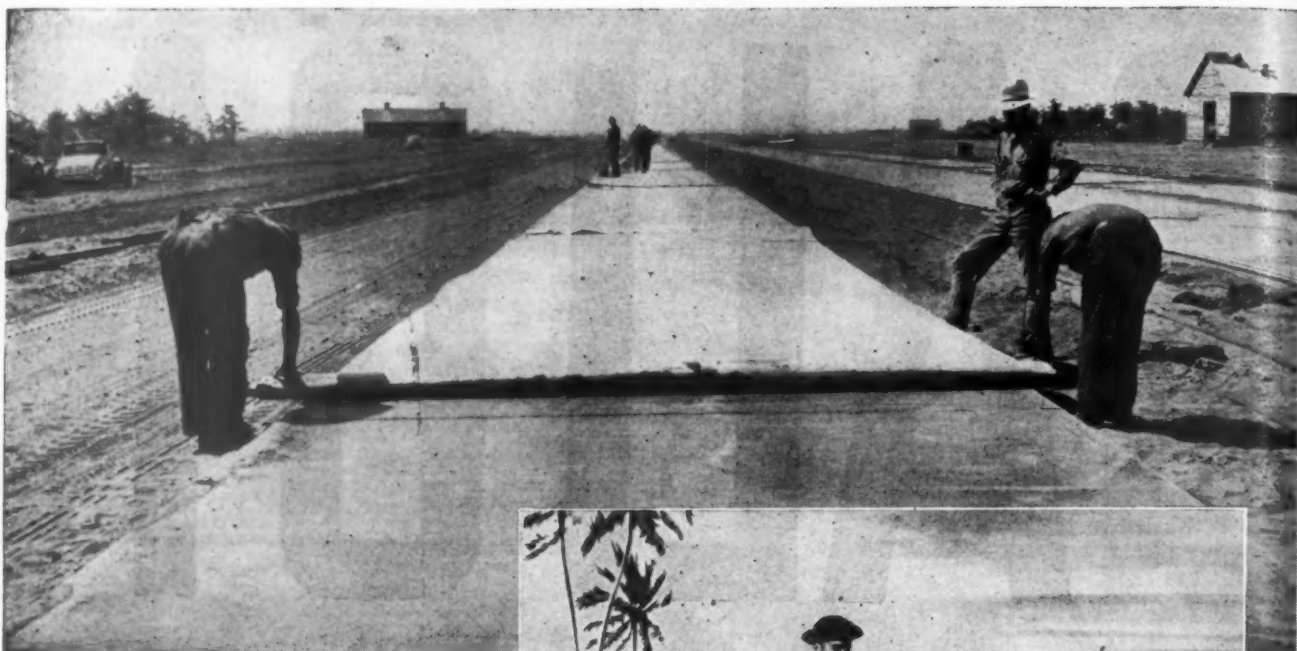


ESTABLISHED
IN
1907

THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

ROADS AND STREETS, April, 1944



SISALKRAFT

Cured Runways for Flight . . . Protects Supplies for the Fight!



After 96 hours of curing under SISALKRAFT blankets in the hottest part of July, the concrete in these air-field runways was still damp. SISALKRAFT has done a dependable peacetime job in protecting newly poured concrete in all kinds of weather.

Because of the toughness and weatherproof qualities that have made SISALKRAFT the preferred concrete curing agent, this scuff-proof, tear-resistant material now protects

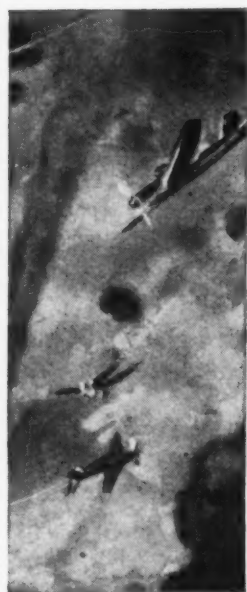
war supplies from ice, sleet, snow, salt water, wind and dirt.

Directly exposed to ice and extreme cold and to tropical heat and moisture, SISALKRAFT is setting new records for endurance and dependability far beyond normal expectancy.

When Victory is won, SISALKRAFT will again be available to protect newly poured concrete, for general job protection and to cover machinery and materials stored in the open. Its amazing war record is convincing proof of its outstanding toughness and weatherproof qualities.



Manufacturers of SISALKRAFT, FIBREEN, SISAL-X,
SISALTAPE AND COPPER-ARMORED SISALKRAFT



**BUY
EXTRA
BONDS!**

We're in a
**DIRT
MOVING
WAR!**



THIS is a dirt-moving war... *a tractor war*. Already the history of World War II is brimful of heroic jobs done by crawler tractors, equipped with bullgraders, bulldozers, scrapers, shovels, winches, and a variety of other dirt-moving equipment.

As a two-star general of the Army Engineers puts it: "Victory seems to favor the side with *the greatest ability to move dirt.*"

Munda... Rendova... the Solomons... Kiska... Sicily... Salerno... everywhere our fighting forces go, you'll find these armored giants building roads, smoothing shell-torn landing fields, pulling heavy guns, handling aircraft bombs.

The Armed Forces have first call on International Trac-

TracTors today. That's why so few new ones are available for civilian use. The new TracTracTors you need so much today, to replace badly worn equipment, are more urgently needed on the fighting fronts.

Many of your old Internationals have a lot of work-hours left in them. Keep those tractors well serviced. Work closely with your International Industrial dealer. He has the skilled service men, the well-equipped shop, and the stock of International Parts to help keep your TracTracTors plugging on the home front, backing up the military TracTracTors on the battle front.

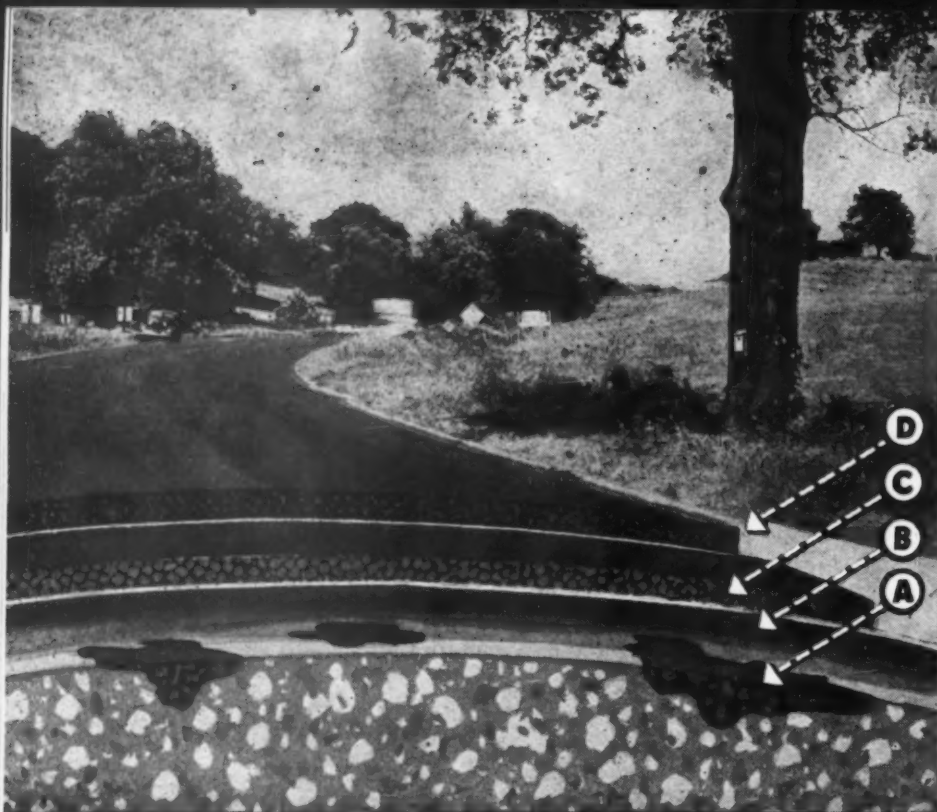
INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue

Chicago 1, Illinois

INTERNATIONAL POWER

ROADS AND STREETS, April, 1944



The why and how of Asphalt-resurfacing

Why alert highway engineers have turned to Asphalt-resurfacing. Many highway departments have found the answer to today's pressing problem of keeping highway systems up to wartime efficiency, and preserving them for peacetime needs by resurfacing with asphalt. They find it offers these advantages:

1. *It restores trunk highways—two or four lanes—to prewar usefulness by providing a safe, smooth-riding, long-wearing surface right over the present roadway.*
2. *It can be done at low cost—much lower than new construction, and with less manpower and materials.*
3. *It can be laid quickly, with little interruption to wartime traffic. One traffic lane is resurfaced at a time—it's ready for use in a few hours.*

4. *It is easily repaired to maintain a smooth-riding surface at all times.*

5. *It can be used to widen and modernize narrow roadways, at the same time they are resurfaced, to take care of increased traffic.*

Asphalt-resurfacing now, will help make vital transport equipment—trucks, buses, tires, etc.—last for the duration. It will give you a head start on your highway program when travel-hungry, peacetime motorists ride again.

A Standard Asphalt Representative will be glad to give you details of the methods and procedure followed by other highway departments now using asphalt-resurfacing to keep up their highway systems. Call the local Standard Oil Company (Indiana) office, or write 910 S. Michigan Avenue, Chicago 5, Illinois.

How Illinois restores full usefulness to trunk highways

The cross-section on the illustration at left shows steps usually taken in asphalt-resurfacing.

A. Spot Patching. Where the old highway surface is badly broken, holes are patched by filling with the same mix as used in the binder course.

B. Prime Coat. A thin coat of cut-back asphalt, spread over the old road surface. When used, it helps to bind the asphalt to the old surface.

C. Binder Course. An asphalt-aggregate mix. It is delivered hot from the central mixing plant to an asphalt finishing machine.

D. Wearing Course. This is the top course, composed of asphaltic concrete with somewhat finer aggregate than is used in the binder course. It is also hot mixed at the central mixing plant, and laid by machine. This top course presents a smooth, waterproof, long-wearing surface which requires no seal coat or stone application.

**START
PAVING
EARLY...**

Make best use of available

- MANPOWER • TANKCARS
- MATERIALS • TIME
- MONEY • WEATHER

KEEP TRAFFIC ROLLING

Oil is Ammunition . . . Use it Wisely

STANDARD OIL COMPANY (INDIANA)

**STANDARD
SERVICE**

from the experience of war comes **AN AIR COMPRESSOR
BUILT TO THE PRECISION OF AN AIRCRAFT MOTOR**



Building machines in which the *quality of performance* often decides victory or men's death, America's production lines have learned to work to standards of precision undreamed of yesterday.

Today, these same micro-precision standards are being applied to the manufacture of an air compressor.

The special characteristic of this compressor is the high efficiency obtained with a simple, accessible mechanism.

With parts micro-honed and lapped to equal precision, it functions as smoothly as a bomber's motors. Demands are met without effort. Reserve power is always present. High levels of performance can be maintained for years.

These qualities are identified in a name you will come to know and remember — "AIR PLUS."

All the equipment Jaeger produces today is for war. Please be patient. Our experience and greatly improved facilities will be available to help you to win your battles tomorrow.

THE JAEGER MACHINE CO., COLUMBUS 16, OHIO

JAEGER *Engineered* EQUIPMENT

"AIR-PLUS" 2-STAGE AIR-COOLED COMPRESSORS, 60 TO 500 FT. — "FLEET-FOOT" CRANE-LOADERS — "SURE PRIME" CENTRIFUGAL PUMPS — "SPEEDLINE" BUILDING MIXERS — "DUAL-MIX" TRUCK MIXERS — "JAEGER" HOISTING ENGINES AND TOWERS — "JAEGER-LAKE-WOOD" PAVING EQUIPMENT

It's Tragic To Let A Motor Truck Work Without A Trailer



Fruehauf Carry-All Trailers, in various designs and with capacities up to 50 tons, are widely used in construction work and for carrying machinery and other heavy loads. Other models are especially adapted for the hauling of sheet and fabricated steel, stone, cement, pipe and other engineering and construction loads.

IT'S wasteful at any time . . . but in wartime, when there is a shortage of rubber, steel, gasoline and oil . . . it's tragic to let a motor truck work without a Trailer!

The war has created shortages of hauling equipment, and of the materials of which the equipment is made. That makes it necessary to conserve materials . . . and to get every possible ounce of work out of the motor trucks available to you.

How? By having your trucks work as mechanical horses and pull their loads on Trailers. Any motor truck, pulling

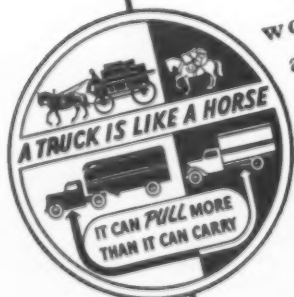
a Trailer, can haul two to four times as big a load as it is designed to carry. And conversion of your trucks into "tractors" to pull Trailers is simple.

The shortage of motor trucks will probably continue long after the war, so it will be wise to make your transportation plans on a long-time basis . . . and to get two, three or four times as much work from your trucks by having them pull Trailers.

Naturally, your savings in money are almost in proportion to the extra work your trucks accomplish.

World's Largest Builders of Truck-Trailers

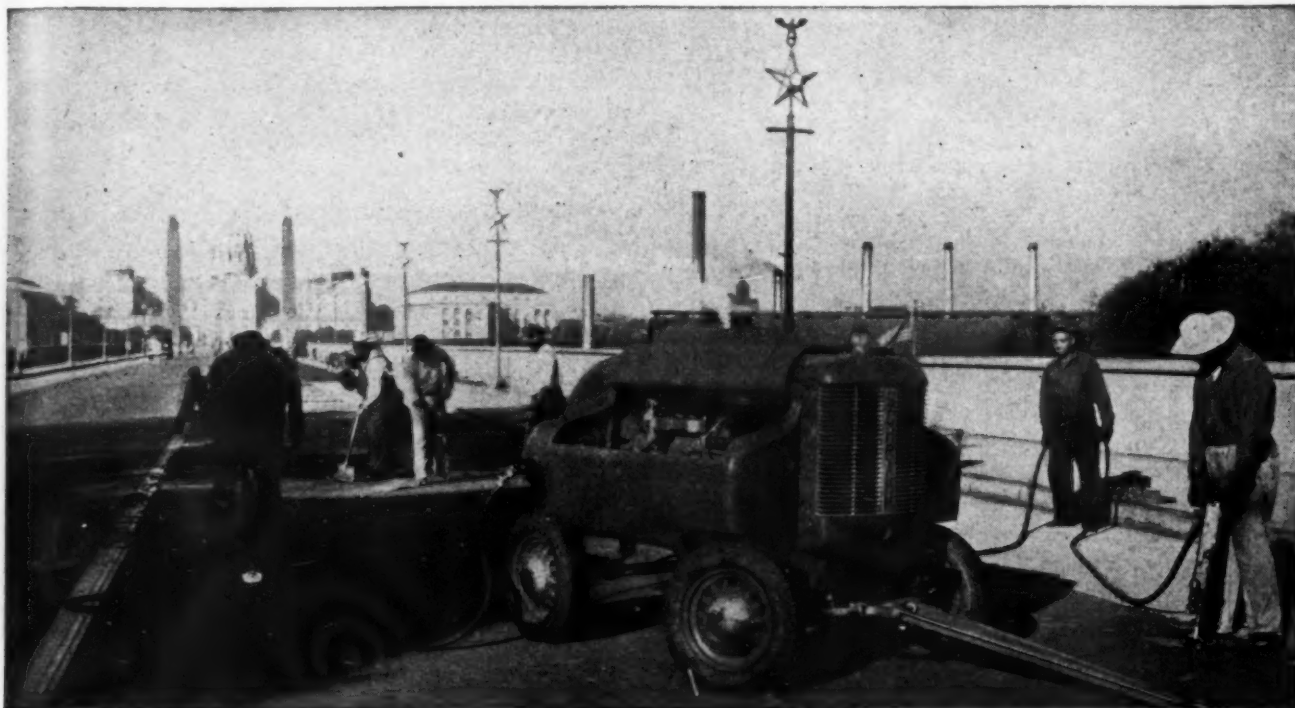
FRUEHAUF TRAILER CO. • **DETROIT**
Service in Principal Cities



FRUEHAUF TRAILERS

"ENGINEERED TRANSPORTATION"

EMERGENCIES REQUIRE QUICK ACTION!



Schramm Compressors furnish air on moment's notice!

Merely by easily moving a Schramm Air Compressor onto the job—and touching a starter button—you get all the compressed air you want—and the emergency job is sped along!

Illustrating the time Schramm was needed to furnish air so that a road atop a busy highway bridge leading to a state capitol could be repaired—quickly!

Schramm met all requirements because it could furnish the necessary air speedily—and the unit was lightweight and com-

pact and thus easily towed about. This represented a big saving in hauling costs—plus plenty of action.

Many features contribute to "air-when-you-want-it" Schramm Compressors: (1) Completely water cooled to provide ideal performance both winter and summer. (2) Seven main bearing supports. (3) Mechanical intake valve. (4) More cylinders and lighter parts. (5) Forced feed lubrication.

If you are not already using a Schramm Air Compressor, it will pay you to write today for illustrated Bulletin 42-PA.

SCHRAMM

INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA



For Maximum Load Transmission
USE
KEYSTONE TONGUE and GROOVE JOINT

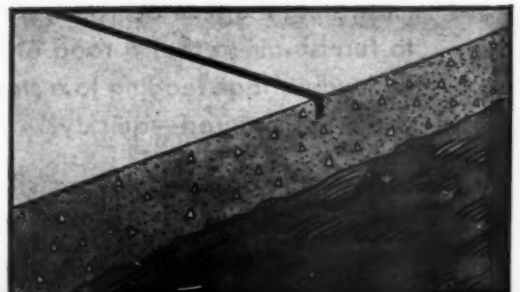
● There are no "blow-ups", no "rough-riding" surfaces when Keystone Center Strip is used. The keyed-joint principle allows for normal expansion and contraction and distributes the load without cracking. Specify it for concrete highways, runways and industrial floor areas.

This pre-moulded asphalt mastic board joint is rigid, waterproof and flexible, and can be used both longitudinally and transversally. It's easily installed, available for immediate shipment and is approved by U. S. Engineers, Navy Department and State Highway Departments. Write for samples.

WHEN YOU HAVE TO KEEP COSTS DOWN....Specify
KEYSTONE ASPHALT MASTIC DUMMY STRIP

Where "weakened plane" type construction joints are required, Keystone Dummy Joint provides low cost, ease of handling and straight alignment without expensive installing machinery. Furnished in full size sheets— $\frac{1}{4}$ " thick—and scored to the required width, it is absolutely waterproof and offers maximum rigidity.

PAVING PRODUCTS CATALOG... for ready reference on Keystone's complete line of paving products—engineer-approved and meeting state and federal specifications—have a copy of the Keystone Catalog in your files. Write Dept. K.



Keystone
ASPHALT PRODUCTS CO.
A DIVISION OF AMERICAN-MARIETTA CO.

GENERAL OFFICE
43 E. OHIO STREET... CHICAGO 11, ILL.
MANUFACTURING PLANT • CHICAGO HEIGHTS, ILL.

PREMOULDED ASPHALT AND FIBRE EXPANSION JOINTS AND ACCESSORIES.
JOINT SEALING COMPOUNDS AND CRACK FILLERS



**A FEW CENTS AN HOUR OPERATES A
BARCO PORTABLE GASOLINE HAMMER**



FIELD POST DRIVING



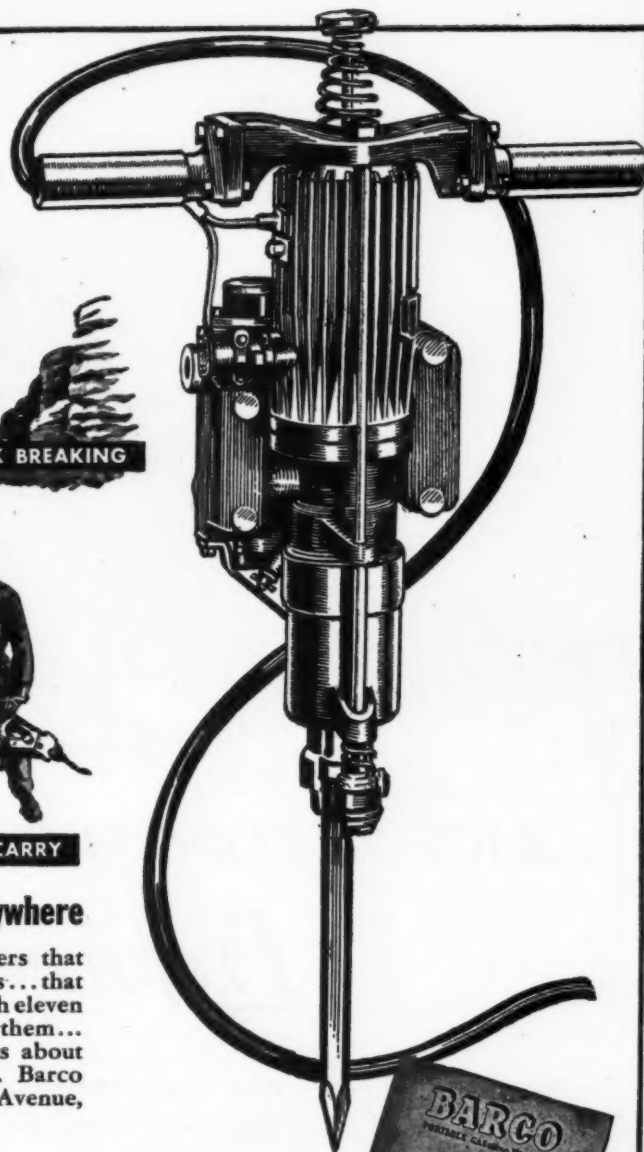
ROCK BREAKING



TAMPING



EASY TO CARRY



Makes Tough Jobs Easier... Can Be Carried Anywhere

Amazing things... these Barco Portable Gas Hammers that cost so little to operate and handle so many big jobs... that carry like lightweights and punch like heavyweights! With eleven special tool attachments, every job is made to order for them... whether it's breaking, driving or tamping. Consult us about your problems... our engineers are at your service. Barco Manufacturing Company, Not Inc., 1815 Winnemac Avenue, Chicago 40, Illinois.

BARCO

PORTABLE GASOLINE HAMMERS

Light in Weight & Rugged in Construction



BARCO MANUFACTURING CO., NOT INC.
1815 Winnemac Ave., Chicago 40, Ill.

Gentlemen:

Without obligation on my part please send me a copy of the
BARCO HAMMER BOOKLET.

Name _____

Street _____

City _____

State _____

ROADS AND STREETS, April, 1944



BACK OF EVERY ATTACK...

Preformed wire rope

Men who land on enemy beachheads—under fire—need every protection. Speed and safety are at a premium. That's why slings that handle landing barges are made of Preformed wire rope.

Every day men trust their lives and their precious matériel to Preformed wire rope. On practically every kind of mobile equipment, Preformed is proving that it's the

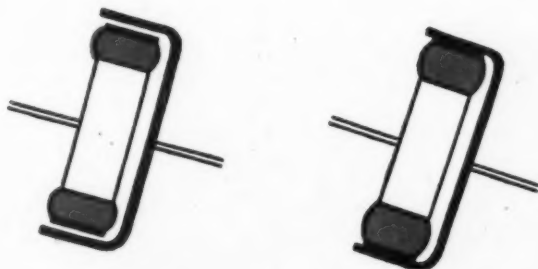
tough wire rope for the tough war jobs.

Fighting men are learning what American industry has known for many years—that Preformed wire rope handles easier, lasts longer, steadies production, saves time, safeguards men and equipment.

That's why, back of every attack, Preformed wire rope is hard at work on all kinds of fighting jobs.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR SUPPLIER FOR PREFORMED WIRE ROPE
ROADS AND STREETS, April, 1944

A Heavy Duty Clutch can be Simple—positive—Trouble-free



See how it works

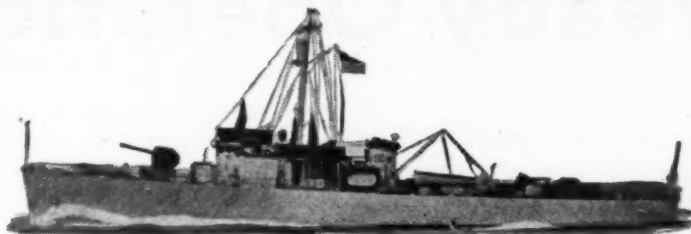
This is a new type of heavy duty clutch. It controls power by air pressure. It is a new—but thoroughly proved—way to transmit power from its source to the machine that does the work.

At the left you see a diagram showing the clutch disengaged. A rubber and fabric air gland, on the drive member, rolls free of the driven member.

At the right, you see the gland inflated. It expands against the driven member, to effect a clutch action that can be as light, or as firm, as you want it. Deflate the gland and the clutch is disengaged.

That's the principle of the Fawick Airflex Clutch—as simple as that! It requires no levers, arms, toggles or springs—no lubrication. No adjustment—low maintenance—long service.

Here is PROOF OF PERFORMANCE



Many hundreds of Vessels in the Navy and Merchant Marine are equipped with the Fawick Clutch.

For descriptive book write to

FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Rd. Cleveland 11, Ohio

In Canada, Renold-Coventry Ltd., 1006 Mountain St.,
Montreal, Canada

In Britain, Crofts Engineers, Ltd., Bradford, England



Here is the CLUTCH that brings you these 12 Advantages

1. Simple in design and operation
2. Flexible control by air
3. No adjustments or oiling—low maintenance
4. Dampens vibration—absorbs shocks
5. Corrects misalignment automatically
6. Smooth starting—no jerks
7. Runs cooler—uniform pressure
8. Controls torque by air pressure
9. Greater capacity—more compact
10. Remote control by air valve
11. Replaces flexible couplings
12. Acts as clutch, slip-clutch, brake and coupling.

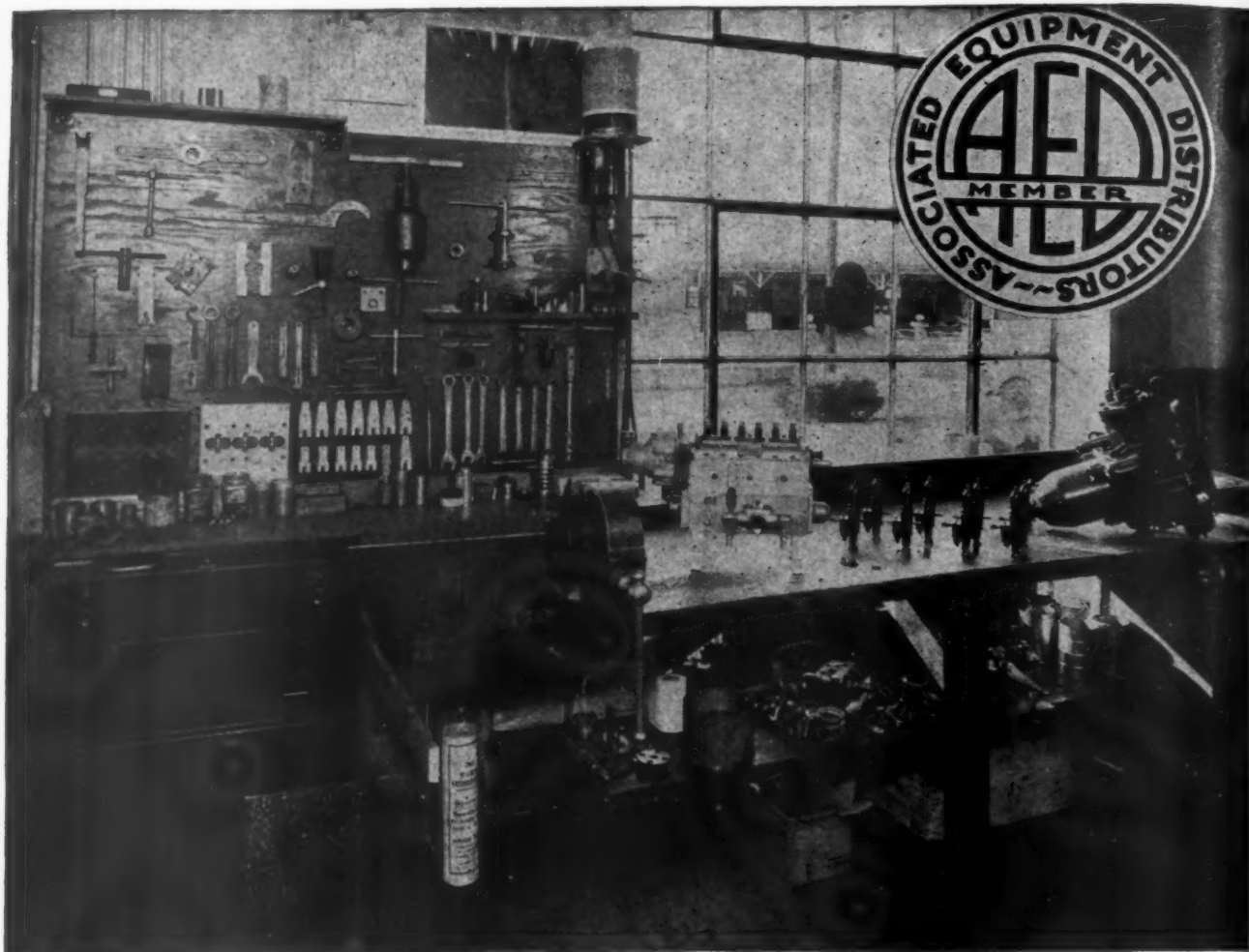
Especially suited for

Heavy Machinery Drives
Paper Mill Drives
Drops and Cranes
Mine Hoists
Diesel Drives
Rubber Mill Drives

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

ROADS AND STREETS, April, 1944



Assuring Steady Operation!

Complete TESTING and REPAIR EQUIPMENT for Diesel engines is just ONE of many facilities which the modern DISTRIBUTOR of heavy construction machinery provides for servicing the machines which he handles—representing the Manufacturers.

He must have a shop with full equipment of machine tools. In many cases he is required by the manufacturer to provide all special hand tools and devices required to fit the machinery which he represents. He is able to rebuild any machine on which he holds a dealership. This is a prerequisite to obtaining representation of most high-grade lines of construction machinery. He is typical of the DISTRIBUTORS who maintain a membership in ASSOCIATED EQUIPMENT DISTRIBUTORS.

Most CONTRACTORS to-day BUY on the basis of adequate SERVICE. Look for A.E.D. distributors in your vicinity or near your next job.

ASSOCIATED EQUIPMENT DISTRIBUTORS

Executive Office. National Press Building, Washington, D. C.

LOOK FOR THE A.E.D. INSIGNIA—THE SYMBOL OF GOOD SERVICE

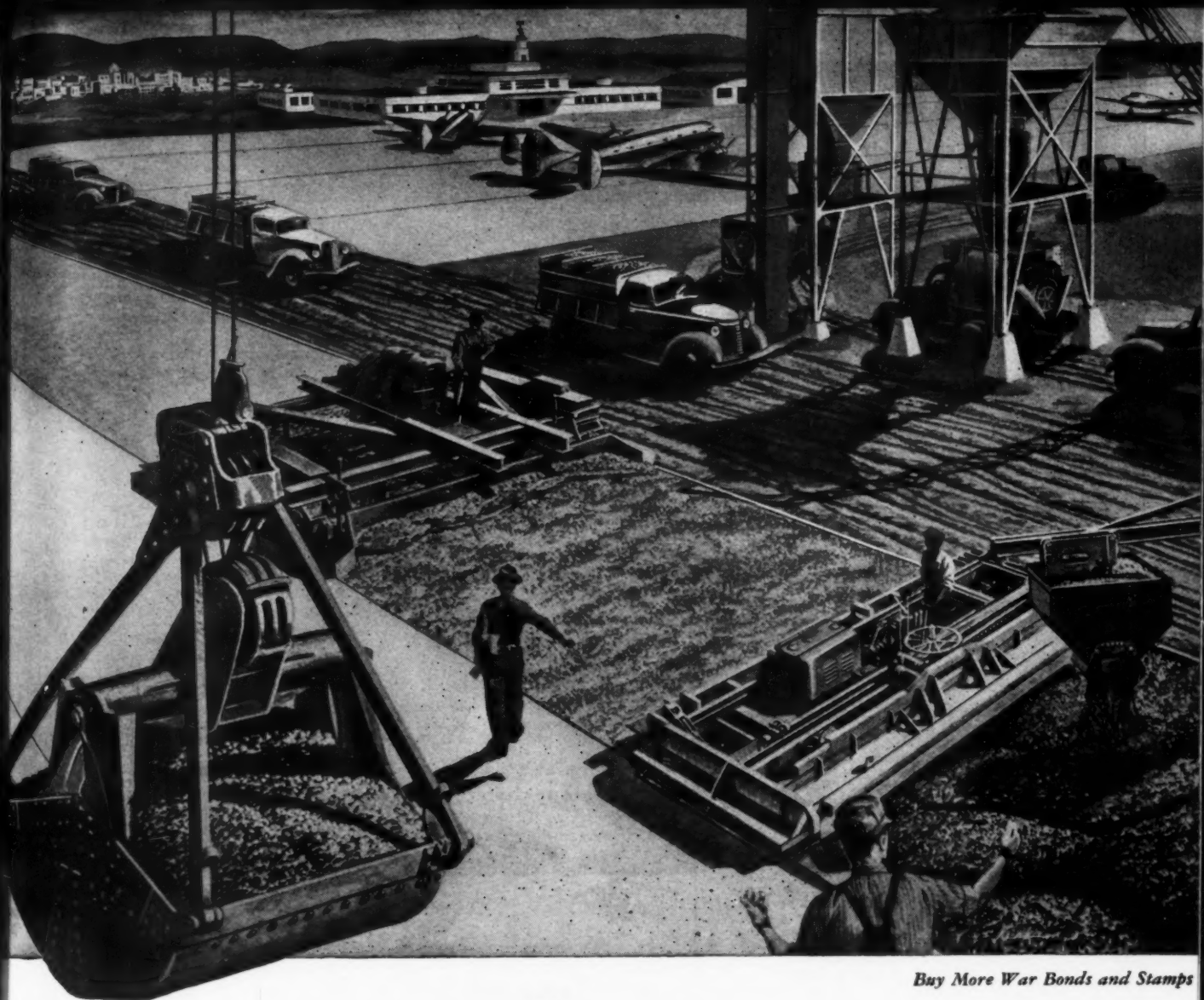
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NATIONAL
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Buy More War Bonds and Stamps

PAVING THE WAY TO *VICTORY!*

Working today with the Armed Forces on various construction projects, preparing airfields and military roads in widely scattered portions of the globe . . . Blaw-Knox construction equipment is helping the cause of freedom in many different ways.

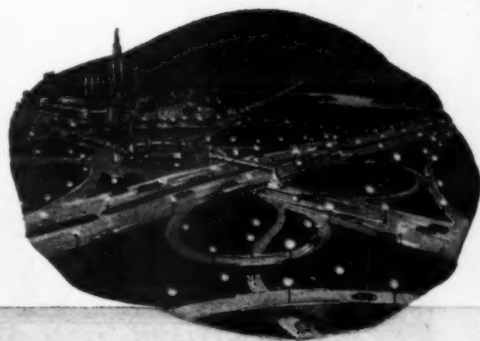
When the gigantic international reconstruction program begins, the facilities and long experience of Blaw-Knox will be called upon to supply contractors everywhere with machinery in full keeping with

the times and with the work to be done.

In the chemical and process industries, Blaw-Knox offers products and services equally helpful. This is also true of fabricated and highly specialized products for the iron and steel and non-ferrous industries—for railroads, public utilities, electronics and for industry in general.

You may find Blaw-Knox products and service useful to you for present production and future planning. We invite a discussion with you on these matters.

Blaw-Knox construction equipment will play an important part in building the World of Tomorrow.



BLAW-KNOX

COMPANY

PACEMAKER FOR
AMERICAN INITIATIVE
AND INGENUITY

3003 FARMERS BANK BLDG.
PITTSBURGH, PA.

LEWIS FOUNDRY & MACHINE DIVISION,
Rolls and Rolling Mill Machinery

POWER PIPING DIVISION, Prefabricated Piping Systems

NATIONAL ALLOY STEEL DIVISION,
Heat and Corrosion-Resistant Alloy Castings

PITTSBURGH ROLLS DIVISION,
Rolls for Steel and Non-Ferrous Rolling Mills

BLAW-KNOX DIVISION, Chemical & Process Plants
& Equipment, Construction Equipment, Radio & Trans-
mission Towers . . . General Industrial Products

COLUMBUS DIVISION, Ordnance Matériel

UNION STEEL CASTINGS DIVISION,
Steel and Alloy Castings

MARTINS FERRY DIVISION,
Bofors Anti-Aircraft Gun Mounts

BLAW-KNOX SPRINKLER DIVISION,
Automatic Sprinklers and Deluge Systems

Four Blaw-Knox Plants have been awarded the Army-Navy "E" for war-production excellence.

A FEW VICTORY PRODUCTS

ANTI-AIRCRAFT GUN MOUNTS

GUN SLIDES

LANDING BARGES

POWDER PLANTS

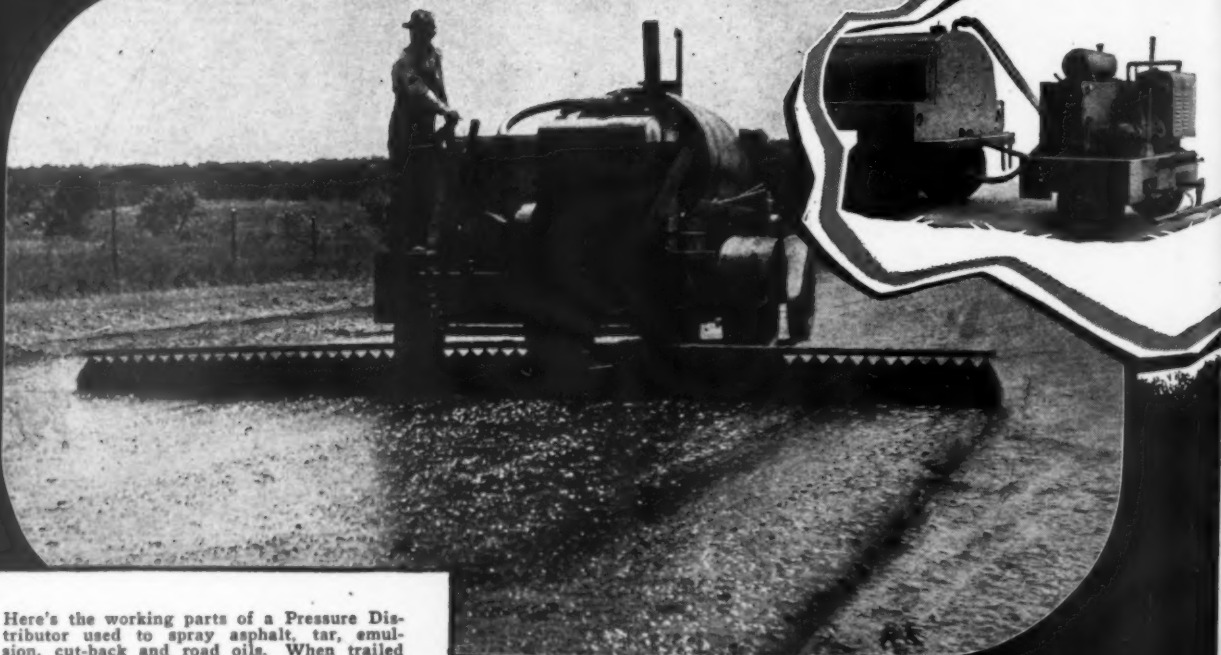
PIPING FOR NAVAL VESSELS

SYNTHETIC RUBBER PLANTS

CAST ARMOR FOR TANKS & NAVAL CONSTRUCTION

CHEMICAL PLANTS

TRAIL-O-DISTRIBUTOR



Here's the working parts of a Pressure Distributor used to spray asphalt, tar, emulsion, cut-back and road oils. When trailed behind a Supply Tank, it functions just like a Distributor.

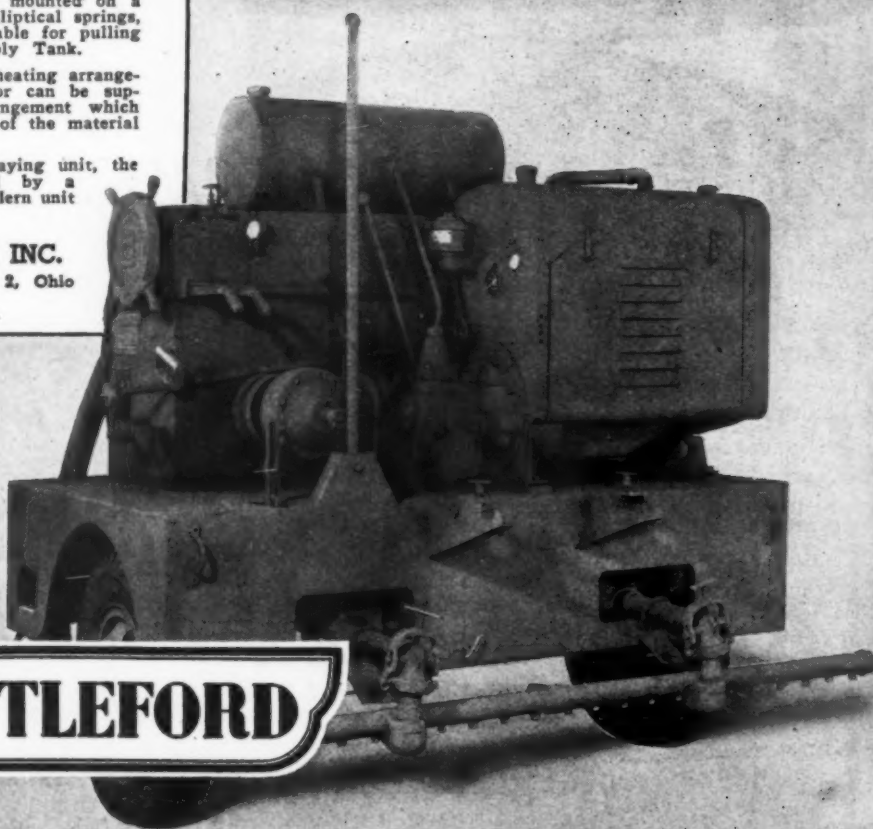
When on long hauls from material supply to the job, a Trail-O-Distributor trailed behind a large Supply Tank is the most efficient method of spraying. Trail-O-Distributor is highly portable, mounted on a special running gear with elliptical springs, pneumatic tires, and adjustable for pulling tongue for hooking on Supply Tank.

If the Supply Tank has heating arrangement, the Trail-O-Distributor can be supplied with circulating arrangement which adds greatly to the heating of the material by agitating while hauling.

For a highly efficient spraying unit, the Trail-O-Distributor supplied by a Supply Tank is the most modern unit made today.

LITTLEFORD BROS., INC.

454 E. Pearl St., Cincinnati 2, Ohio



LITTLEFORD

AMERICA IS *Built with Aggregate!*



Cedarapids

Built by
IOWA

THE IOWA LINE

of Material Handling Equipment
Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS — STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING
SCREENS
STRAIGHT LINE ROCK AND
GRAVEL PLANTS
FEEDERS — TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS


The Skylines of America—

Virtually stone by stone, they have risen out of a wilderness — the most practical demonstration of what free enterprise can do!

Led by Iowa, aggregate producing equipment has come a long way! The cost of building the skylines of the future, the highways of the future, the skyways of the future, is going to be a lot less for America's coming generations because of Iowa "Cedarapids" equipment.

When figuring your future contracts, plan to check into "Cedarapids" advantages — they are different — they mean lower cost aggregate, a bidding advantage to you and more profit. Come to headquarters for aggregate producing and crushing equipment.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA





Greater Yardage per Dollar

Hough Hydraulic Loaders on International wheeled tractors have stood the test of time. They have proved economical and speedy in handling dirt, sand, gravel, coal, snow and other bulk materials, handling greater yardage per dollar invested.

Road contractors use them for sub-grading, leveling, charging concrete mixers and black top machines, loading or spreading materials, trimming shoulders and borrow pit work, etc.

Highway departments use them for road maintenance, loading stone, sand and gravel, loading from pits, stock piles, etc.

Municipalities use them for street repairs, handling garbage, snow removal and loading, material handling and loading.

Nationally known users operate up to twenty Hough Tractor Loaders and the value of the many units employed in the war effort is attested to by our "E" flag. The Hough Hydraulic Loader on the International I-6 tractor pictured at the left is at work at a Southern Army post, where it is used for construction work, coal handling and clean-up work.

Ask your International Tractor distributor about the many unusual engineering, construction and operating details of these handy units.

THE FRANK G. HOUGH CO.
Libertyville, Illinois
"Since 1920"

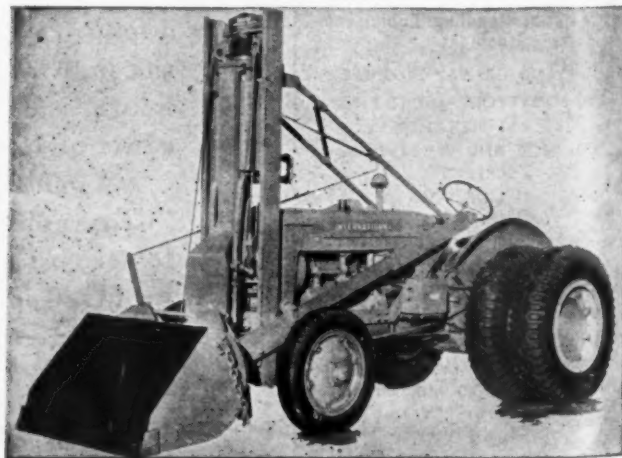


HOUGH

"HUFF"

Tractor Shovels

Road Sweepers



Ground Crew

Next time you see a bomber overhead—stop and think for a minute of what it took to put it up there.

Think of the aluminum that sheathes its sleek lines . . . aluminum from a plant that was only a blueprint yesterday. Think of the propellers and the engines that drive it . . . propellers and engines from factories that were only corn fields the summer before. And think of the men who fly it and fight it . . . men schooled at air fields and training stations which were created virtually overnight.

All of these facilities and more were required to put that bomber up there . . . and all of them were provided by a vast ground crew that numbers its men and machines in the millions—America's Construction Industry.

Here, again, is a job that called for the best in every man and every piece of equipment . . . a job that required power of proven stamina, economy and dependability . . . a job that demanded nothing less than *Cummins Diesel Power*. CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the sixth and last in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. In the construction field, Cummins Dependable Diesels are used to power all types of heavy-duty dirt moving and material handling machinery—trucks, shovels, draglines, tractors, compressors and many other kinds of equipment. The giant 60-yard Tournapull illustrated here is powered by a pair of 200 hp. (Supercharged) Cummins Diesels.





**...in Peacetime
and Wartime -**

**POWERFUL Trailbuilders
and Bulldozers**

**BONDS
SPEED
VICTORY**

These rugged GW Units are now doing such a vital job for our Armed Forces in this Wartime. GW Units will again take their place in Peacetime, after having distinguished themselves for their outstanding performance.

ALSO

- | | |
|----------------------------|-----------------------|
| 2-wheel Hydraulic Scrapers | • Hydraulic Rippers |
| 4-wheel Hydraulic Scrapers | • Cable Rippers |
| 4-wheel Cable Scrapers | • Cable Control Units |



GW ROAD MACHINERY
is Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

The Drivers' Favorite Truck

...IN THE
CONSTRUCTION
INDUSTRY



Ask the driver of a Marmon-Herrington *All-Wheel-Drive* Ford how this truck "rates" with him. His response will be quick and enthusiastic—for no other truck gives him such a sense of sureness, so much confidence of his ability to "make the grade" and to get in and out of the toughest spots.

There's a feeling of security, power, and invincibility in *all wheels driving* that he cannot experience with any conventional drive truck, regardless of its size and horse power.

Once he has sat behind the wheel, and actually

felt the front wheels, as well as the rear wheels, take hold, an ordinary drive truck lacks vitality and ability to do the things he wants to do.

For general construction work, road building and road maintenance, these economical, fast and unusually maneuverable trucks have no equal. For snow-removal and for operation in loose dirt, mud, and on slippery surfaces they are unexcelled.

Buy war Savings Bonds now, and plan to invest in Marmon-Herrington *All-Wheel-Drive* converted Fords when the war ends.

MARMON-HERRINGTON

All-Wheel-Drive

MARMON-HERRINGTON CO., Inc., INDIANAPOLIS 7, INDIANA

Cable Address: MARTON

1,000 TONS per DAY

with Universal Standard 6 Unit Plant



Over 100 tons per hour, 1,000 tons per day—day after day—of ballast, mostly $1\frac{1}{2}$ " and 1", are being turned out at minimum cost for the Burlington Railroad at Wyalusing, Wisc. This plant, one of a number owned by E. C. Schroeder of McGregor, Iowa, consists of 6 standard units selected as most suitable for this railside quarry. Timber was used wherever possible to conserve metal. Output is up to the expectations of all concerned.

This plant, made up of 6 "packaged" units and arranged to provide a minimum of handling, includes: a 20" x 36" roller bearing primary jaw crusher of Universal's exclusive

light-strong Streamlined design; a 40" x 24" roller bearing star gear roll crusher for secondary reduction; 4' x 8' three deck gyrating screen; a 36" x 8' apron feeder with bar grizzly and by-pass (to by-pass fines around primary crusher); a 24" x 108' lattice frame conveyor from primary crusher to screen; and an 18" x 44' channel frame return conveyor. This is another case where soundly engineered standard units of the proper size selected from Universal's complete line were brought together to form an efficient, profitable plant. Probably we can do the same for you.

UNIVERSAL ENGINEERING CORPORATION

(Formerly
Universal Crusher Co.)

631 C Ave. West,
Cedar Rapids, Ia.

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS



Jaw Crusher



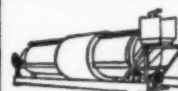
Roll Crusher



Gyating Screen



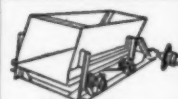
Log Washer



Scrubber Screen



"Lattice" Conveyor



Mechanical Feeder



Sand Screw



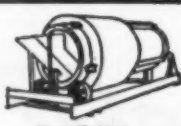
Steel Bin



Rotovator



V-Belt Drive



Revolving Screen



Pulverizer



Bucket Elevator



Apron Feeder



Sand Tank

Valuable VERSATILITY

The versatility of Bucyrus-Erie Bullgraders constantly proves their value on a wide range of dirt-moving jobs. Here is just one of the unusual applications which their all-round ability permits them to handle efficiently. Note how the Bullgrader in the cut above channels the ore vein out of the cliff and dumps it over the slope; how Bullgrader below pushes the ore over the loading ramp into the dump truck spotted below. An average of 200 tons in a seven-hour shift with a two-man crew was loaded in this operation.

Besides unusual uses such as this, Bucyrus-Erie Bullgraders can give you proved economy and speed on a host of other jobs. On road maintenance, digging ditches, grading airports, removing stumps and trees, and many other applications, you'll find that they can step in and do the job fast.

Find out more about the profit-making versatility of Bucyrus-Erie Bullgraders and other tractor equipment units from your International TracTractor Distributor.

**BUCYRUS
ERIE**

N-57

This Bullgrader carves out the ore and dumps it over the slope.

This Bullgrader pushes the ore over the ramp into dump trucks.

**BUCYRUS
ERIE**
TRACTOR EQUIPMENT

SEE YOUR
INTERNATIONAL TRACTRATOR

DISTRIBUTOR

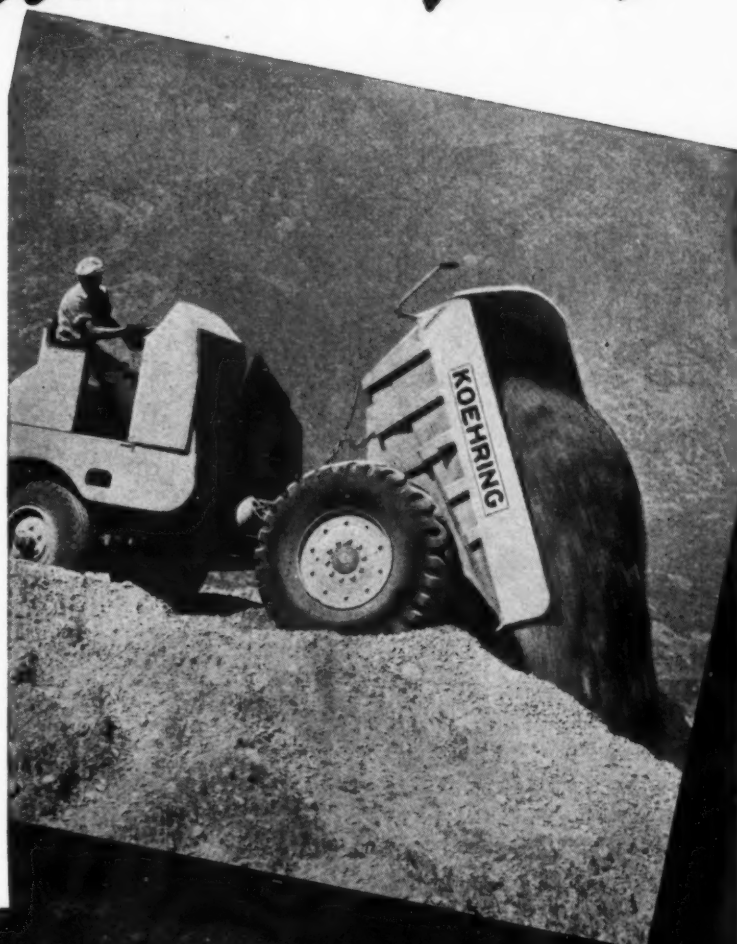
Instantaneous Dumping

ROCK or DIRT Dumped Instantaneously

Moving rock or dirt at high speed requires speed in all operations. Koehring Dumpers save seconds every time the load is dumped . . . instantaneously. Seconds saved speed production. Rock or dirt is dumped equally fast and the load is dumped clean every time . . . ready for a full load every trip. KOEHRING DUMPTORS HAUL ROCK OR DIRT FASTER THAN ANY OTHER METHOD.

KOEHRING COMPANY

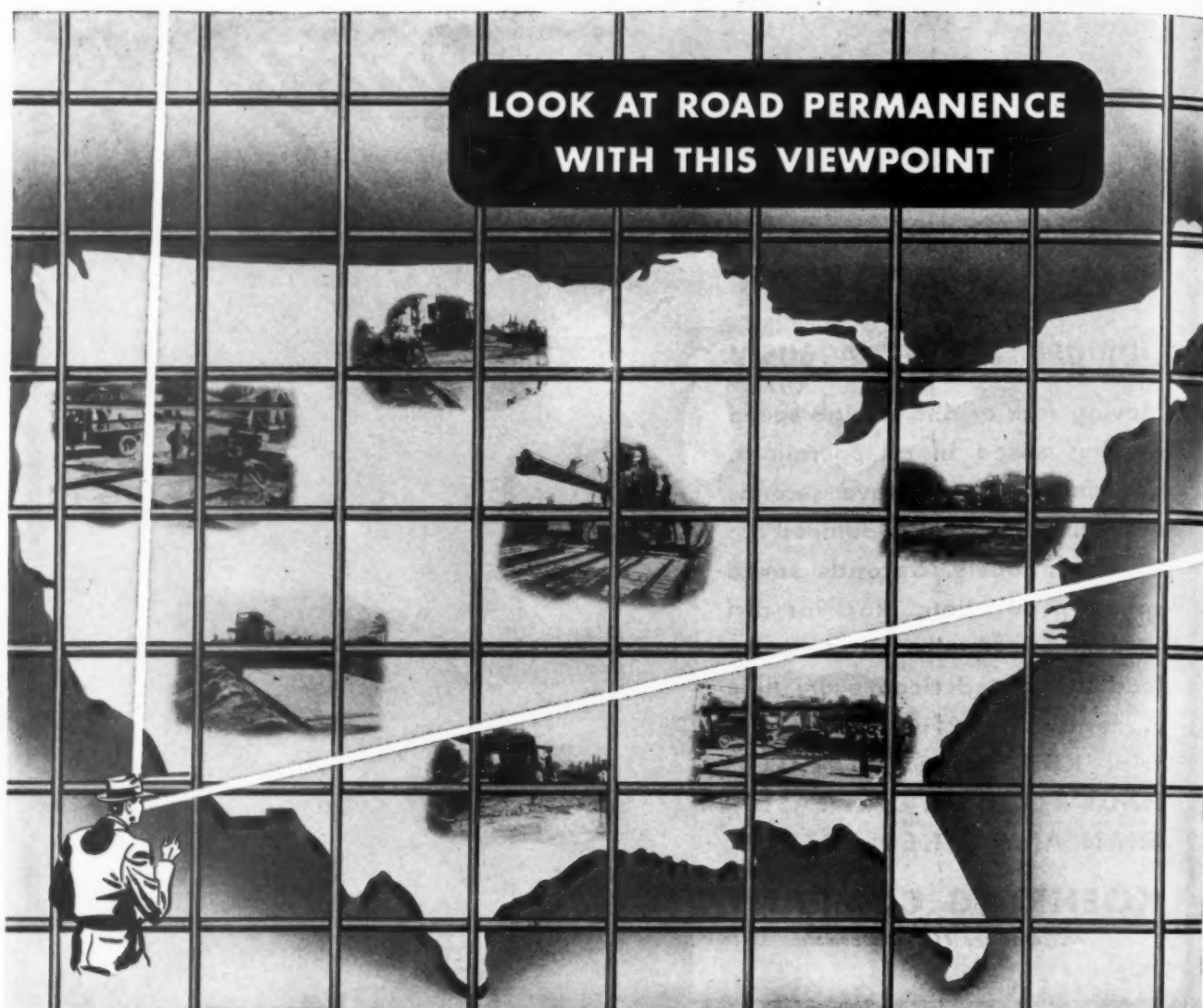
Milwaukee 10, Wisconsin



DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.



HEAVY-DUTY CONSTRUCTION EQUIPMENT



ALL OVER THE MAP—TRUSCON WELDED STEEL FABRIC IS PROVING THAT

Steel Builds Roads that Endure!

Steel and concrete have proved their special worth in millions of miles of highways. At every point of the compass . . . under every conceivable condition of weather . . . Truscon Welded Steel Fabric Reinforcement, and other specialized Truscon roadbuilding products, are assuring long-life concrete pavements.

Engineers and designers have found by experience, practice and research that the following advantages can be expected from Truscon Welded Steel Fabric Reinforcement:

Provides resistance to cracking due to shrinkage of concrete during setting period.

Provides tensile strength necessary

to resist subgrade friction caused by expansion and contraction of the concrete slab due to temperature changes.

Provides increased resistance to cracking of concrete due to warping under load.

Provides resistance to the development of microscopic cracks into visible cracks.

Provides resistance to cracks opening and allowing the entrance of water.

Provides resistance to broken ends of slabs separating at a crack.

Decreases spalling and progressive disintegration of the concrete.

When you plan roads, plan them well. Use structural designs that have been proved the most economical, durable and serviceable in the *long run*. Use Truscon Welded Steel Fabric with other associated Truscon roadbuilding products, and assure lasting prestige for you and more permanent highways for the communities you serve.



TRUSCON

Steel Company

YOUNGSTOWN 1, OHIO

SUBSIDIARY OF REPUBLIC STEEL CORPORATION

ROADS AND STREETS, April, 1944

ONE OF FOUR LINK-BELT SPEEDERS

Owned by
BLUE DIAMOND CORP.
LOS ANGELES, CALIF.
**WORKING AT SYNTHETIC
RUBBER PLANT!**

Finger-tip control by the operator and rugged, maintenance-free construction combine to provide contractors with tops in efficient operation when there is a Link-Belt Speeder on the job!

**A SURE SIGN of
AN EFFICIENT
OPERATION**

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)



Footsteps to a Paving Record

Under the urgency of war, Multi Foote Pavers, leaders in peacetime production, are setting new records for high speed paving, for rugged dependability, and for cooperation. Recently on a rush job in the Nevada Desert two contractors teamed up a pair of 34E Multi Foote Pavers to pour a record of 111,406 cu. yds. of 9 in. slab in a period of 27 days—ahead of schedule, working against sand, wind, cold, and other tough conditions. An average of 4,000 cu. yds. per day was maintained. In one 24-hr. period, 6,890 cu. yds. were placed!

Part of the time the pavers worked side by side as shown. At other times they were separated by more than a mile, pouring at intersections, turning points, and spots provided for warming up. Adaptability and cooperation got the job done. Contractors were J.A. Carson Co.

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers.

THE FOOTE COMPANY, INC.
NUNDA • NEW YORK

and N.M. Ball Sons. The field was being rebuilt to speed up training of Air Force bombardiers and gunners.

In planning for postwar construction, consider the importance of selecting equipment now that will enable you to meet all competition—that will not be obsolete after the firing ceases, that will provide big production, dependable service free of excessive repair charges and delays, that will show low costs. Multi Foote Pavers led the field before the war. Multi Foote Pavers are hanging up new records in rush construction now. Multi Foote Pavers will be available, adaptable, dependable and economical when the postwar battle for business begins. Make sure you stay competitive by getting the Paver which is still setting records.

Multi Foote Pavers Conform to A. G. C. Standards and Specifications



MULTI FOOTE

CONCRETE PAVERS





◀ **Left: YESTERDAY** — 2-cycle Diesels helped rush through huge ordnance projects . . . shown here on one of the biggest!

Below: TODAY — Still going strong, these 2-cycle Diesel veterans push a mountain into the sea building a Pacific base.

Veterans... back in Action!

They're at it again! They put in thousands of tough hours on the huge, home front construction program of the past several years . . . now the same 2-cycle Diesel tractors are handling even tougher going on overseas work for our Armed Forces.

Completely overhauled and repaired—much of it done by Allis-Chalmers dealers — there's plenty of service left in these fast-moving, powerful tractors. Today they are doing their part building advanced bases and helping reconstruct devastated areas.

2-cycle Diesel tractors are built to last . . . to perform faithfully for years with less attention. Moreover, they go right to work . . . start in-

stantly — no waiting around for the engine to warm up. Lubricating truck wheels only once every 200 hours saves on greasing time, too!

The records that 2-cycle Diesel tractors have made and are making on giant defense projects and on the war fronts are your assurance they will stand up to any peace time job — no matter how tough. Figure on them for your Postwar construction.



ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE • U.S.A.



BY NIGHT

A "SCOTCHLITE" sign is clear—brilliant—easy to read. An identical reproduction of the daytime sign. "SCOTCHLITE's" flexibility and low cost permit complete background reflectorizing—increasing the attention value and making legends and warnings "pop out" like a lighted sign. "SCOTCHLITE" colors are brilliant in reflection too, another advantage in making night and day sign appearance identical.

BY DAY

A "SCOTCHLITE" sign gives you the clarity and efficiency of a standard painted sign plus the outstanding advantage of nighttime reflection. It is flexible, easy to handle, and readily adaptable to all types of sign lettering. Available in four colors; white, yellow, silver or red—standard colors for all types of traffic, warning, direction and barricade signs and markers. Why not try "SCOTCHLITE" on your signs?



MINNESOTA MINING AND MANUFACTURING CO.

GENERAL OFFICES: SAINT PAUL 6, MINN.
BRANCHES IN PRINCIPAL CITIES

Minnesota Mining & Manufacturing Company
900 Fauquier Avenue, Saint Paul 6, Minnesota

RS-444

- ☐ Kindly send further information on "SCOTCHLITE"
☐ Have your sales representative call

Name _____
Address _____
City _____ Zone _____ State _____

A booster hoist under ANY TYPE OF BODY spells **SAVINGS**



Paid for itself in a single season!

Empire State Pickling Co., Gorman, N. Y., installed the St. Paul Booster Hoist shown above to haul away and dump waste cabbage leaves. This waste was previously forked off by hand.

"We are well satisfied with this hoist," they say, "and in one season it has more than paid for itself. It also serves as a general all-purpose truck, hauling sand, gravel, dirt and coal when necessary. We say 'it can't be beat' and gladly recommend the use of such hoisting equipment to other concerns."

Your stake or platform body can be converted!

Please address inquiries to:

ST. PAUL HYDRAULIC HOIST COMPANY
2207 University Avenue, S. E.
MINNEAPOLIS 14 MINNESOTA

Here is the Cheapest, Best Way TO BUILD FILLS



PROPOSED /
FINISHED
SLOPE →



1ST LIFT

PROPOSED /
FINISHED
SLOPE →



3RD LIFT

4TH LIFT

PROPOSED /
FINISHED
SLOPE →



5TH LIFT

FINISHED
SLOPE →



LEVEL AND FINISH

In starting a fill, it is always best to build up the two outer edges first to conform with the desired slope line.

Then spread one extra lift on both sides, compacting the material as close to the outer edges as possible.

Next fill the center and repeat the cycle, keeping the sides high and the center low as you carry the fill upward.

When you reach the top, fill in the center, level off by dragging your scraper blade and finish to required grade.

Don't Be Fooled By "Gypo" Parts!

Our job—and yours—is to keep your present LaPlant-Choate equipment working efficiently until final Victory is won. Therefore, don't be fooled by substitute, makeshift parts being offered to-day through questionable sources. For your own protection, use only Certified LaPlant-Choate parts available through your LaPlant-Choate "Caterpillar" distributor.

★ Remember when the only way to build fills was to dump dirt in a pile with one kind of equipment—and spread it with something else? Now the complete job—digging, hauling, dumping and spreading—is done entirely by LaPlant-Choate "Carrimor" Scrapers. It's faster, cheaper, better because you can carry lifts to any desired depth . . . compact the fill and carry the slope at the same time. In addition, you can use "Carrimors" for leveling and rough finishing—thus releasing less adaptable equipment for other work. See your LaPlant-Choate "Caterpillar" distributor or write: LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

LaPLANT-CHOATE

Earthmoving and Land Clearing Equipment



**WE ARE
WORKING ON THE
WAR-ROAD**



THE PERFECTION STEEL BODY CO., GALION, OHIO

PERFECTION

TRUCK BODIES AND HOISTS

AS evidenced by the Army-Navy "E" Pennant and Stars, PERFECTION has carried its reputation for "a job well-done" right over onto the war-road. Right now, we can furnish truck bodies and hoists only for those purposes which have a direct bearing on the war effort.

You can make a valuable contribution to the war effort by emphasizing to your employees the necessity for *careful driving habits*, and by giving extra good care and maintenance to your present equipment.

We will again be back on peace-time roads one of these days—with better hoists, stake bodies, dump bodies, and express bodies than ever before. Watch our ads for future announcements.

WELLMAN WILLIAMS TYPE BUCKETS

BUCKET QUALITY BACKED BY TWO FAMOUS NAMES

Williams Buckets have been famous for nearly 40 years for their many mechanical features.

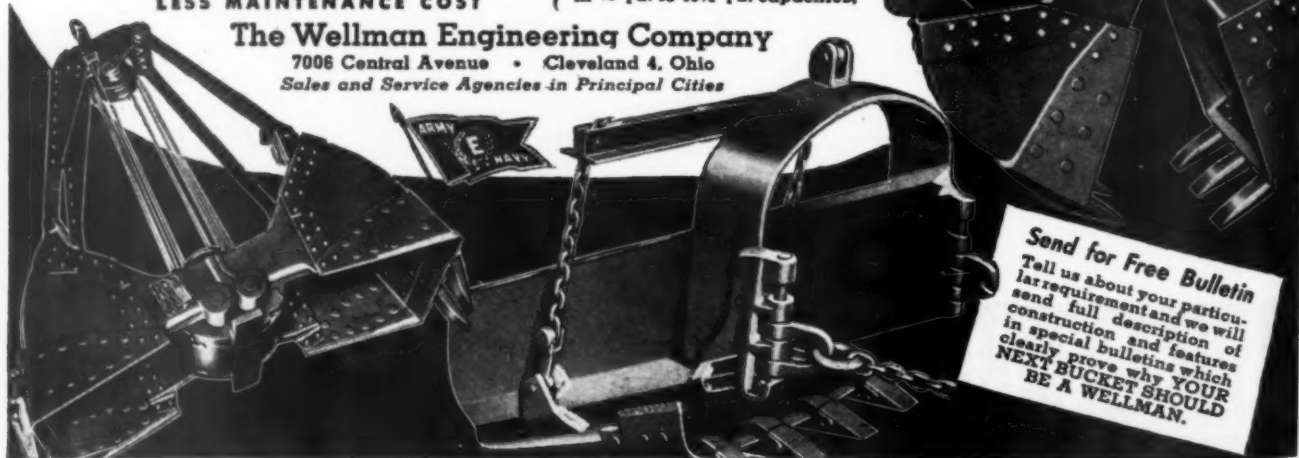
Since 1931, Williams Buckets have been built by Wellman, known for many great engineering achievements in the heavy iron-ore, coal, and steel industries. The welded construction which featured Wellman custom-built buckets for extra heavy steel mill service, is now used in all

Wellman-Williams Buckets
FOR LONGER SERVICE WITH
LESS MAINTENANCE COST

Built in Multiple Rope, Power
Arm, and Power Wheel Types
in $\frac{3}{4}$ yd. to 16 $\frac{1}{2}$ yd. capacities.

The Wellman Engineering Company

7006 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in Principal Cities



Send for Free Bulletin
Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

Oils, Asphalts and Tars

QUICKEST HEATING

Speediest Transfer to Distributor

BROS CIRCULATOR

**A CIRCULATING
TANK CAR HEATER**



Designed for maximum efficiency, low operating costs and long life

The Bros Circulator starts asphalts and tars at 20° above their solidifying point. It raises the temperature of a car 50° F. per hour after circulation is started—and transfers the heated materials to the distributor at the rate of 325 gallons per minute. Steam is seldom, if ever required, as average SC7 can be started at 60° F. Oil is taken in at the coldest spot on the circulator and discharged at the hottest spot so there's no danger of scorching, burning or cracking the asphalt. That's its operating record.

Its design assures maximum economy and efficiency. The Oil Burner is non-clogging and air-atomizing with positive flame control. There is no carbon to remove from the heating element—a feature that saves time and money—and the heating element contains no dangerous gas pockets to cause explosion.

The burner of the pre-heater is removable and connected by long rubber tubing to the fuel oil pump. It can be used as a torch for application of direct flame heat to car valve section or to hose, to speed flow of oil.

A silent chain drive, running in oil, operates pump unit, providing noiseless, trouble-free performance. Four pumping speeds are provided for maximum efficiency. Shear pin protection for pump and drive shaft. Ford Motor Power Unit. No draining between jobs.

With its low center of gravity, the Bros Circulator permits Semi-Trailer mounting so essential for fast, safe driving. Complete details will be sent on request.

ROAD MACHINERY DIVISION

WM. BROS BOILER & MFG. CO.

Minneapolis 14, Minnesota

BROS CIRCULATOR

A CIRCULATING TANK CAR HEATER



**SNOW PLOWS
ALL TYPES**



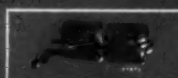
**BULDOZERS AND
TRAILBUILDERS**



TANK CAR HEATERS



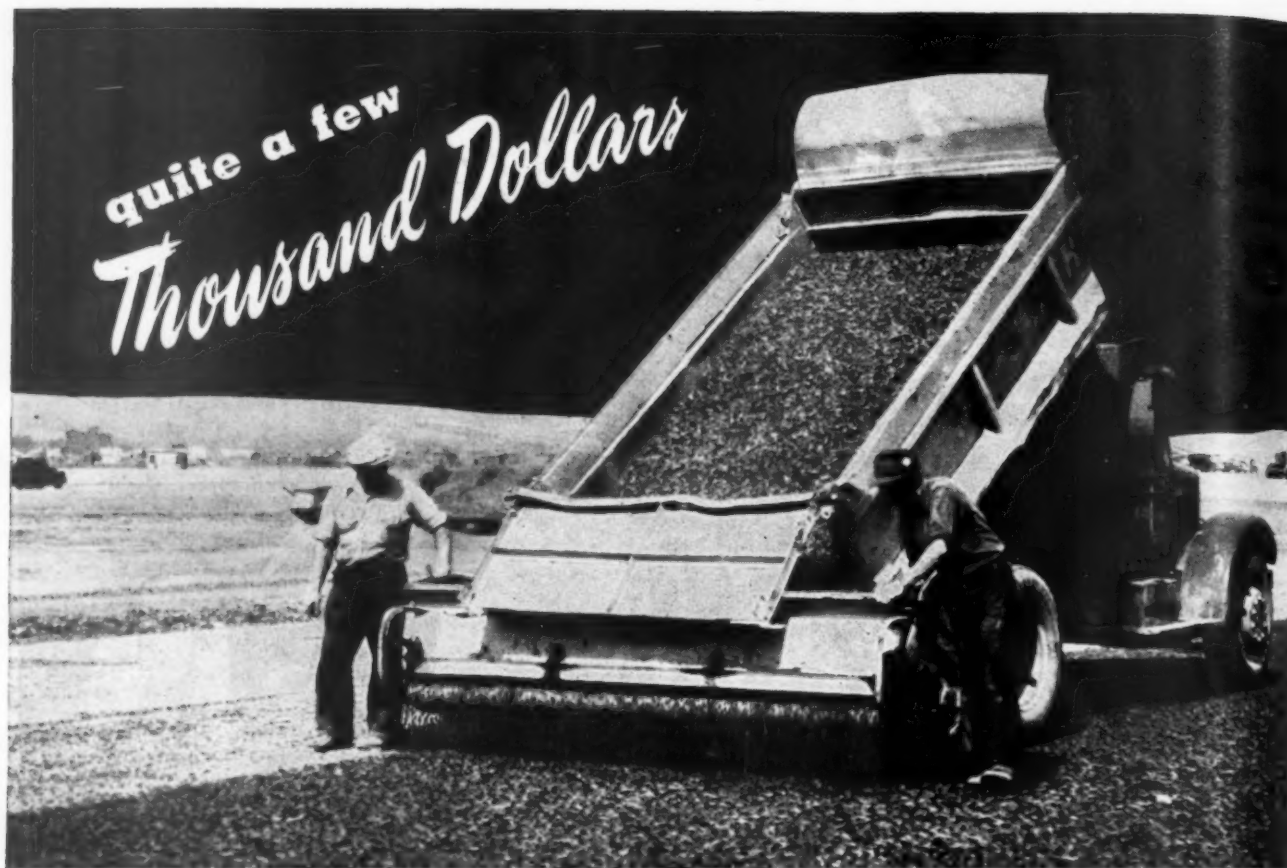
CIRCULATORS



TAMPING ROLLERS



ROAD ROLLERS



Would Pay for Quite a few **BUCKEYE SPREADERS**



In answer to a direct question on what his Buckeye Spreader had saved him over previous methods of spreading, one contractor wrote, "Quite a few thousand dollars."* Other users made the comments listed at the right.

Accuracy is the keynote behind Buckeye Spreader success. A spirally fluted, transmission-driven, adjustable speed feed roll grips the material and distributes it positively through a measured gate opening. This insures a "metered" flow that spreads material within a variation from calculated volume of as little as 1% to 3% on many jobs. The Buckeye Spreader is far more than a truck tailgate attachment — it is a *Spreading machine* from the ground up. Complete data in 8 PAGE BULLETIN. Write for copy.

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

Convertible Shovels
Spreaders
Power Finegraders

"Save 30 to 50% on materials."

"This is the best spreader I ever used."

"Saves \$32.00 per mile."

"Saves approx. \$25.00 per mile."

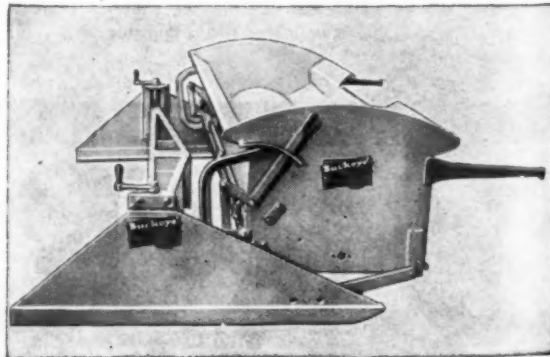
"Saves at least 20% on material."

"Accurate within 2%."

*Signed statements on file. Photostatic copies available.

STRIKE-OFF ATTACHMENT

This attachment permits spreading base coarses to 6 inches depth. Blade is mounted on skids and is adjustable by hand cranks.



Buckeye

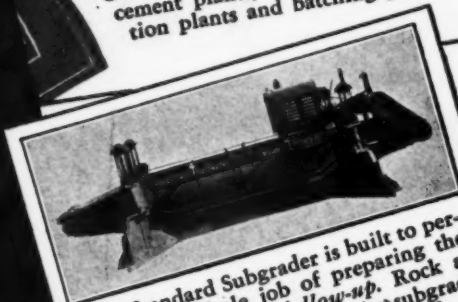
Trenchers
Tractor Equipment
Road Wideners



POST-WAR PLANS ARE "IN THE WORKS" AT STANDARD



Standard Portable Paving Plant is assembled of interchangeable Standard Units. These can be used for bulk cement plants, aggregate production plants and batching plants.



The Standard Subgrader is built to perform the whole job of preparing the subgrade *without follow-up*. Rock as large as 14" mixed with the subgrade dirt, has been successfully handled.



When comparing performance records of batching plants, owners say Standard's simplicity, accuracy, reliability and freedom from mechanical, electrical or other operation troubles surpass all other types of cumulative weighing systems.



The Standard Finisher has several exclusive features. Special construction at the ends of grading blade eliminates wear on surface of side forms. Edging attachment eliminates waste and hand finishing costs.

Improved Equipment! New Equipment! Distributors throughout the country!

Here at Standard Steel we are working "around the clock" on war production. Nevertheless, we believe it a patriotic duty, as well as a practical necessity to plan now for tomorrow. Post-war demands in the construction field will call for ready and effective equipment. Standard will be "on top" of these demands with an augmented, well-engineered line of construction equipment.

Added to our already long line will be new equipment built with Standard exclusive features.

Standard Steel products have long been dominant in the West. Contractors and distributors, *wherever they may be*, should find out about this company's sturdy, well-built, economical equipment and their plans for tomorrow.

CM2-444A

STANDARD

STEEL CORPORATION

General Offices and Plant: 5001 South Boyle Avenue
Los Angeles 11, California

DON'T TELL
TOJO!

Another

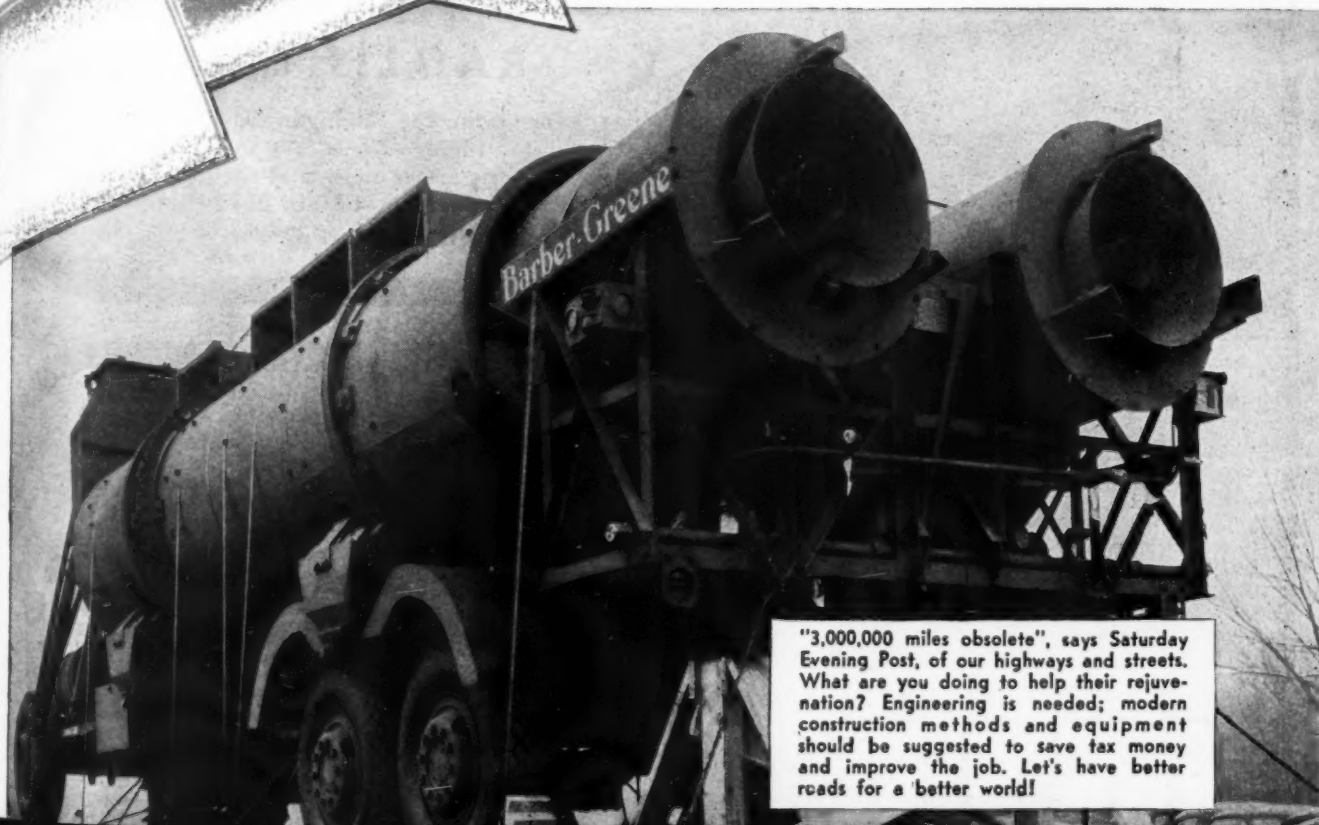
BARBIE

AURORA, ILLINOIS, U. S. A.

Secret Weapon

Hitler and Tojo don't know it, but they have caught more hell through American construction equipment and methods than any secret weapon their evil minds can dream up. This is a Barber-Greene Dual Drum Dryer, not a rocket gun—one of the units of the B-G Army Airport Asphalt Plant. These plants built the runways that made possible the successful invasion of Sicily and Italy. They are resurfacing R.A.F. and American runways in England, building airfields and roads from Australia to the Aleutians. Just ordinary American construction equipment, tested and proved by American contractors before the war; ready to take its place in our highly mechanized military operations. Equipment so common that nobody thought to tell Tojo and Hitler about it.

44-6



"3,000,000 miles obsolete", says Saturday Evening Post, of our highways and streets. What are you doing to help their rejuvenation? Engineering is needed; modern construction methods and equipment should be suggested to save tax money and improve the job. Let's have better roads for a better world!

BARBER-GREENE

AURORA, ILLINOIS, U. S. A.

MICHIGAN*can do***JOBS for YOU****① CRANE****② CLAM****③ SHOVEL**

From Clamshell or Crane use, the $\frac{3}{8}$ yard and $\frac{1}{2}$ yard MICHIGANS can be quickly converted to shovel use by changing booms. Much time is saved because in the MICHIGAN, no changes are necessary in the operating mechanism. Full circle loading.

**④ DRAGLINE**

On the regular crane boom, the Michigan Dragline equipment can be rigged in an hour or less. An unusually long reach is possible with this attachment, and the high speed, AIR-CONTROLLED operation of all MICHIGANS means added work capacity.

**⑤ TRENCH HOE**

This attachment, with its eleven-foot digging depth, finds scores of uses in public works and private construction.

Trench Hoe is available for both $\frac{3}{8}$ yard and $\frac{1}{2}$ yard models, as are all attachments pictured here.



WRITE FOR
 $\frac{1}{2}$ YARD BULLETIN RS44T
 AND $\frac{3}{8}$ YARD BULLETIN RS44K

MICHIGAN

POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN

3,200 HOURS!

From One VELVETOUCH Master Clutch Facing

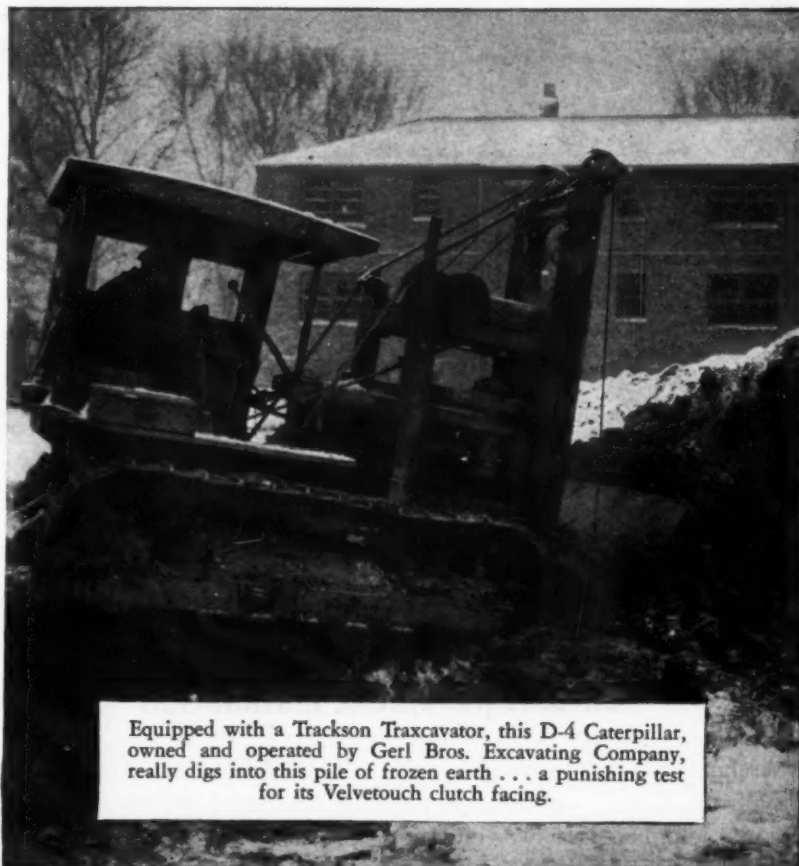
Excavating Contractor Reports Complete Satisfaction With Velvetouch in D-4 Caterpillar

Two and one-half years of dependable, smooth performance . . . and still good for many additional trouble-free operating hours! That's the story of the Velvetouch facing installed in the master clutch of a D-4 Caterpillar tractor, owned and operated by Gerl Bros. Excavating Company of Euclid, Ohio.

Andrew Gerl, Jr., head of the firm, sums up his opinion of Velvetouch in one sentence: "We are now using Velvetouch facings exclusively in all of our earth-moving equipment."

VELVETOUCH IS ALL METAL . . . made entirely from compressed powdered metals, welded to steel backing plates. And because Velvetouch is all metal, it wears longer . . . requires less adjustment . . . is little affected by oil or water.

Below: These Velvetouch Bimetallic clutch facings are the type used in the master clutch of the D-4 Caterpillar tractor.



Equipped with a Trackson Traxcavator, this D-4 Caterpillar, owned and operated by Gerl Bros. Excavating Company, really digs into this pile of frozen earth . . . a punishing test for its Velvetouch clutch facing.

For complete details write to:

THE S. K. WELLMAN CO.

1374 EAST 51st ST. • CLEVELAND 3, OHIO

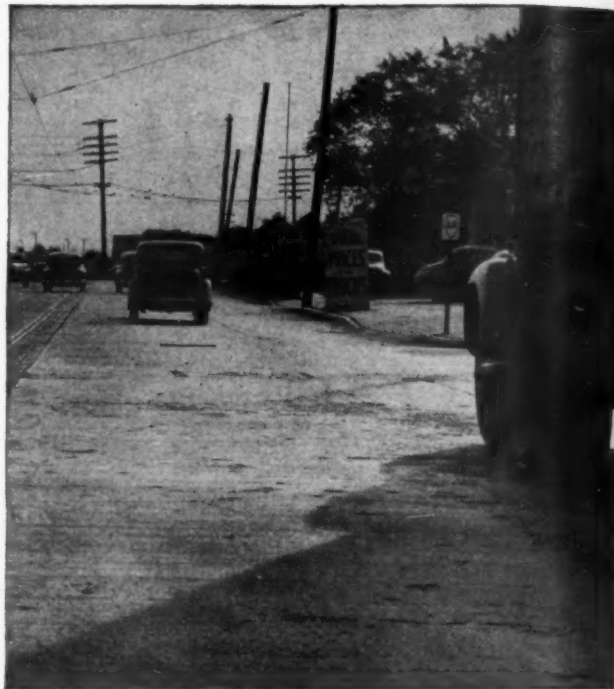
FOR BRAKE AND CLUTCH

USE

Velvetouch

BIMETALLIC FRICTION MATERIAL—TRADE MARK REGISTERED

AIR-ENTRAINING CEMENT REQUIRED FOR ALL STATE CONCRETE HIGHWAYS IN METROPOLITAN CHICAGO



Test installations on South Archer Avenue, Chicago, laid in 1941 and photographed in 1943. Left: eastbound lane placed with Atlas Duraplastic is practically scale-free. Right: westbound lane placed with normal portland cement shows scaling after two winters of identical salt de-icing treatments.

Atlas Duraplastic* proves scale-resisting value of air-entraining portland cement on test pavement installation

Archer Avenue, the main highway from downtown Chicago to the municipal airport, was chosen by the Illinois Division of Highways for a test installation of air-entraining portland cement. The results of two winters' exposure to heavy applications of de-icing salts (pictured above), show how Atlas Duraplastic met the test. Duraplastic pavements in other states and cities have uniformly duplicated results of this test.

Some of these installations are now in their fifth winter, and all are practically scale-free.

Atlas Duraplastic is a true portland cement in which a small quantity of air-entraining material, in an amount precisely determined for uniform performance, is interground during manufacture. Its effectiveness in protecting concrete against the effects of freezing and thawing weather and against scaling due to salts used for ice

removal is the result of more than eight years of research and tests by Universal Atlas in the laboratory, in the plant and on the job.

For reprints of articles from technical journals and for detailed information on Atlas Duraplastic, write to Technical Service Bureau, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Bldg., New York 17, N. Y.

OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham, Waco.

*Trademark registered, U. A. C. Co.; all rights reserved.

RS-D-1



ATLAS DURAPLASTIC CEMENT

A Universal Atlas Product

Springtime!

THE *Right* TIME TO PUT YOUR ROADS IN ORDER!

You don't have to be an aviator to know what "crack-ups" are ... you'll have plenty of them this Spring, as usual, in roads ravished by "old man Winter." With FWD Model HG All-Season Road Maintenance Trucks, you can give damaged roads "first aid" in a hurry, and later fully repair or fully recondition them. There are more than 60 road building, conditioning, and maintenance jobs FWDs can do faster, better, at less cost ... for instance:

- **Scarifying** ... raising buried binding material ... mixing soil constituents ... loosening irregular hard-pan ... displacing oversize material.
- **Grading** ... cutting down backslopes with leaning wheel grader ... widening traveled roadway ... removing slides ... deepening ditches and gutters.
- **Ice Removal** ... with underbody scraper.

- **Compacting** surface materials with flat blade.
- **Marking** ... replacing markers, signs, traffic signals.

- **Reclaiming** ... saving valuable surfacing material from road shoulders.

- **Hauling** ... gravel, sand, asphalt heaters, materials for patching or rebuilding roads ... hauling snow fence to storage ... hauling men, equipment and materials to remote locations.

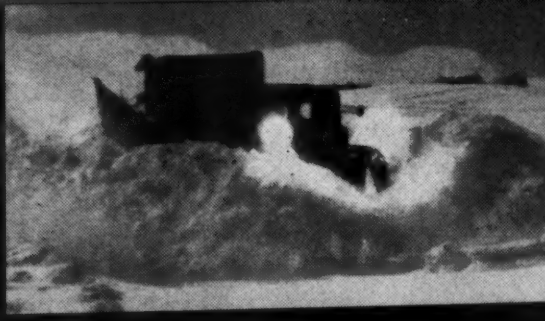
... and many other heavy-duty road jobs that need FWD's extra ruggedness, stamina and endurance for sustained superior performance, Spring, Summer, Fall and Winter. Easy on gas, oil, tires, replacements ... FWD's hold all operating and maintenance costs to a minimum.

THE FOUR WHEEL DRIVE AUTO COMPANY - Clintonville, Wis.
Canadian Factory: Kitchener, Ontario

FWD factory branches, dealers, and district servicemen are all pledged to help you get the most out of your trucks by aiding your program to keep existing trucks trucking. Call the nearest FWD man regularly for sound maintenance advice and skilled service.



PATROLS ROADS ★ HAULS MATERIALS ★ PLOWS SNOW ★





**PEACE WILL FIND MARIONS
BUILDING A BETTER WORLD FROM
THE NATION'S ROCK PILES**

For more than half-a-century, MARION shovels have been called "Rock Shovels." This nickname has weathered several wars and still remains as an endorsement of MARIONS powerful performance in heavy digging. This unchallenged reputation will serve them well during the trying years ahead when a better world will arise from the Nation's rock piles, with the aid of MARIONS.



THE MARION STEAM SHOVEL COMPANY • MARION, OHIO



Offers
SHOVELS • CRANES
DRAGLINES • PULL-SHOVELS
CLAMSHELLS • WALKERS

*To Make Short Work of Every
Material Handling Job*

¾ CU. YD. TO 35 CU. YDS.





GET YOUR HEAVY DUTY TRUCK THIS SIMPLE WAY

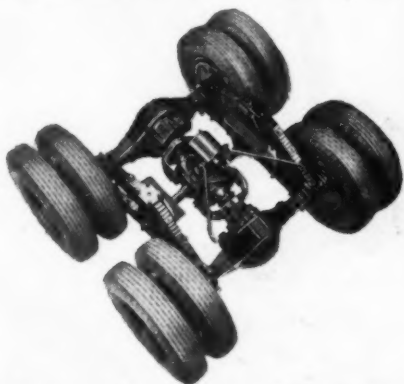
Install a **THORNTON *FOUR REAR WHEEL* DRIVE** **ON YOUR 1½-2 TON MEDIUM TRUCK**

• New heavy duty trucks are very scarce, yet you need one badly to handle your hauling requirements.

And the cost of your converted heavy duty truck is less than the original cost of a new heavy truck of the same capabilities.

Here's How You Get That Truck

Go to your nearest truck dealer and arrange to have a THORNTON Four-Rear-Wheel DRIVE installed. This will convert your new or used 1½-2 ton medium into a six-wheel, heavy duty truck . . . with two driving axles *under* the load . . . capable of hauling 100% more payload, climbing steeper grades, moving loads over bad ground conditions.



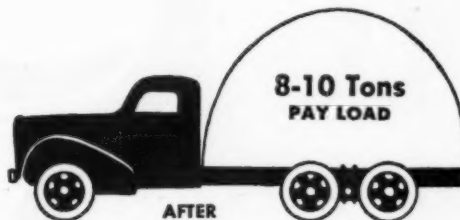
This is the THORNTON DRIVE, consisting of two driving axles; two-speed gear case assembly; "walking beam" type springs; wheels; tires.

THORNTON TANDEM CO.

8731 GRINNELL AVENUE • PLaza 9700
DETROIT 13, MICHIGAN, U. S. A.

Investigate THORNTON Automatic-Locking
DIFFERENTIAL for Replacement in Truck Axles

In Canada see: H. V. WELLES, LTD., Windsor



HERE'S WHAT YOU DO

Write for complete facts. Send for free descriptive folders today.

TEAR OUT AND MAIL

Thornton Tandem Co.
8731 Grinnell Avenue
Detroit 13, Michigan, U.S.A.

Please send me catalog of facts on changing my 1½-2 ton truck into a heavy duty truck.

Name _____
Address _____
City _____ State _____
Make of Truck _____ Year _____
Used for _____



SHACKLE A *Policeman*



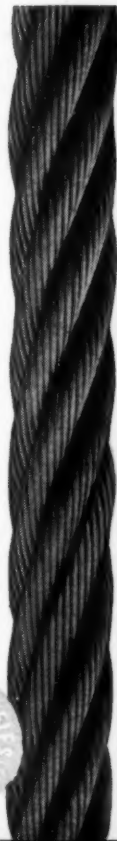
...**LAY-SET PREFORMED IS AT EASE**

Putting non-preformed wire rope on your machines is like putting shackles on a policeman. You shouldn't expect a wire rope that is twisted tightly and under constant tension, to operate well or long.

In Hazard **LAY-SET Preformed** every wire and strand is pre-shaped to the exact curve it assumes in the finished rope. That's why **LAY-SET** is at ease, relaxed, free to work and work willingly. Being free of torsional stress, Hazard **LAY-SET Preformed** lasts longer, gives you greater dollar value. Be sure your next rope is Hazard **LAY-SET Preformed**.

Ever since Pearl Harbor, and even before, Hazard **LAY-SET Preformed** has been saving time and money for the Government, the Armed Forces, and the taxpayer.

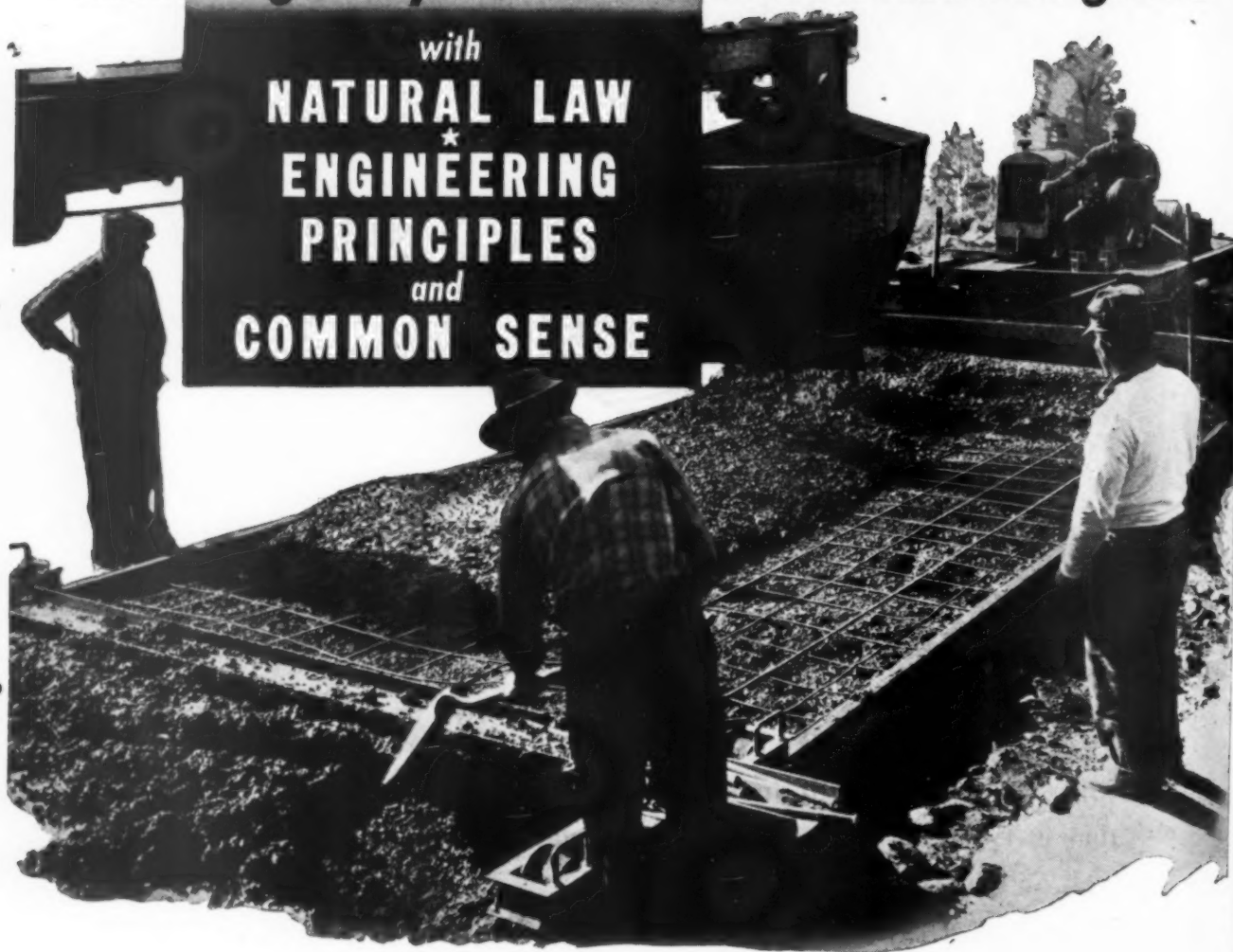
HAZARD WIRE ROPE DIVISION • Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Tacoma, San Francisco
AMERICAN CHAIN & CABLE COMPANY, INC. • BRIDGEPORT • CONNECTICUT



HAZARD **LAY-SET** *Preformed* **WIRE ROPE**

These highway builders worked hand in glove

with
**NATURAL LAW
★
ENGINEERING
PRINCIPLES
and
COMMON SENSE**



Cracks, once started in unreinforced concrete road surfaces need only the action of moisture and frost, or the friction between slab and sub-grade due to expansion and contraction, to spread wider and wider, deeper and deeper, until the slab is seriously damaged. This is Nature.

But . . . when conditions which cause cracking meet the unyielding resistance set up in concrete by *Welded Wire Reinforcement*, damaging progress is definitely retarded, often positively stopped. And when incipient cracks do occur they are held in control by the accurately spaced mesh so

that no serious enlargement can develop. This is Engineering.

Because these qualities of reinforcement are so self-evident, so inescapable, most modern highways, landing fields and other concrete surfaces are laid with Steel Reinforcement—more specifically, with *Pittsburgh Welded Wire Reinforcement*. This is Common Sense.

When planning concrete construction write us for full technical information.

PITTSBURGH STEEL COMPANY
1661 GRANT BUILDING • PITTSBURGH, PA.



Pittsburgh Welded Wire Reinforcement

ROADS AND STREETS

April, 1944, Vol. 87, No. 4

Patching and Widening Methods on 23-Mile Georgia Project

Soil-cement spreader box of special design saves labor and material on 23 miles of contract work being pushed this spring by W. L. Cobb and Scott Construction Co.

By G. T. McDONALD
State Highway Engineer
Atlanta, Georgia

USE of soil cement as base material for shoulders and patching is a feature of a 23-mile \$454,000 widen-repair-resurface project on U. S. 29 southeast of Atlanta. Being the first such state job in Georgia, it was watched with special interest both as to field methods and results secured. Adjoining contracts were let late in 1943 to W. L. Cobb, Inc., of Decatur and Scott Construction Co. of Thomasville.

Briefly the project consisted of patching the existing 18-ft. pavement and widening to 23 ft. base width by placing 30 in. soil-cement strips on either side; correcting sags and increasing superelevation where necessary with machine-placed asphaltic concrete black base or binder mix; then applying asphalt concrete binder and surface course to a surface width of 22 ft.

Old Story of Overloaded Road

The existing pavement along here is one of the state's earlier concrete roads. It was the familiar story of suddenly increased heavy trucking since the war, involving overloads which hastened structural failure and made extensive patching and blanketing advisable to salvage the road and keep it in service for the duration.

Most of the patched areas were small. The procedure was to remove broken pavement, trimming the edges

with an air hammer and carrying patch excavation down 9 in. or 2 in. below the center thickness of slab (later brought to grade with 1" of binder material before blanketing). After replacing any unsatisfactory soil material encountered, plant-mixed soil-cement was dumped in the hole, spread 11 in. thick and compacted to 8 in. or an inch below the surrounding slab using a pneumatic tamper.

For ordinary small patches a wood frame was set around the hole to hold loose patch material in place during compaction.

Expansion joints in the slab were cleaned and packed with sawdust and cut back asphalt, sawdust being used

as a wartime substitute for more desirable but unobtainable cottonseed hulls.

Cobb's contract involved tearing out one 800 ft. section of pavement completely and rebuilding the base 23 ft. wide with soil-cement of 8 in. uniform compacted thickness. The old concrete at this point had apparently been frozen while hardening.

Soil Cement Shoulders—How mixed and Placed

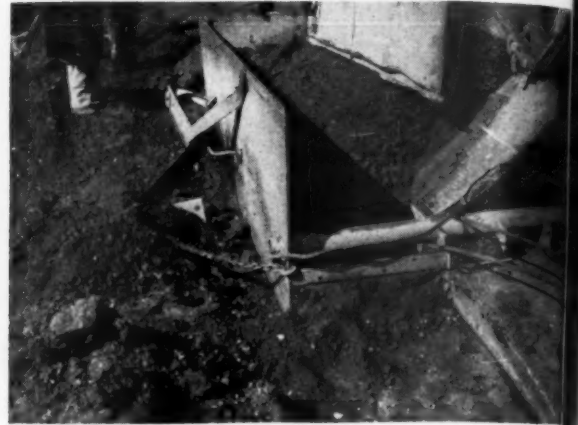
The soil-cement mixture consisted of field soil containing up to 15% clay from selected borrow pits, to which was added a 35% ratio of "stabilizer" or graded crushed stone or slag (1½ in. max) and 9% cement, the cement factor found by preliminary testing to be desirable. Optimum moisture content was about



Both contractors on this Georgia project made handy use of specially designed spreader boxes which, when lowered along the prepared shoulder trench, left a neatly formed layer of moist soil-cement mixture ready for the sheepfoot. This is on the W. L. Cobb, Inc., contract



1 (Left) After the trench plow passed along, the spreader box was set in the trench, hooked to a tractor which towed it as shown (tractor or grader). The box holds one dump truck load



2 (Right) Note details of spreader box, which is 30x72 in. and has a blade fastened on the outer side for pulling loose dirt against the edge of the deposited material

3 Shoulder mix was then thoroughly compacted by several passages of the sheepfoot

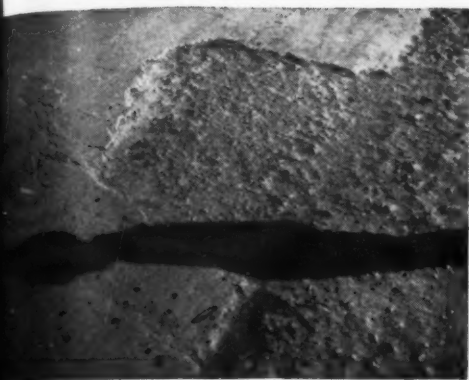


4 After the sheepfoot has packed out, the surface was smoothed and further compacted by several passages of the contractor's tank truck

5 (Left) In addition to sheepfoot compaction, Scott Construction Co. used pneumatic hand tampers on soil-cement shoulder strips

6 (Below) After compaction to a level $\frac{1}{2}$ in. below surface of old pavement, the soil-cement was covered with moist earth for 7 days, then bladed and broomed clean preparatory to laying hot-mix blanket





7 Defective pavement areas were cut away and the areas filled with 8 in. of soil-cement mix, hand tamped to level $\frac{1}{2}$ in. to 1 in. below the pavement. Where blanket course was not placed at once, patches were given a protective bituminous covering



8 A two-course bituminous topping was then placed over the full width of the widened pavement. This shows Scott Construction Co.'s binder crew

9 (Left) Rolling the binder course on a turn, where incidentally an extra course of asphaltic concrete has been placed to correct the superelevation



10 (Right) Showing completed soil-cement shoulder widening and also a section where the entire pavement was replaced with soil-cement preparatory to covering

11 (Lower right) Scott Construction Co. mixed its soil-cement in this plant. It included a converted asphalt pug mill, equipped with a spray bar for adding water. Clam-shell handled crushed stone or slag, as well as stock piled sand-clay brought from adjacent borrow pit by hauling scrapers

12 Showing stationary diesel power plant, with fuel drum, and water tank for use in mixing soil-cement. Scott's plant





Granddaddy of the jeep is this short-wheel-base roustabout truck built by the Scott outfit in its spare time to help tow equipment



M. R. Dempster, superintendent for W. L. Cobb; Judd Scott and J. D. Scott of Scott Construction Co., and (in center) E. D. Reed, project engineer on the two widening resurfacing contracts



11.5% (11.3% on the north end of the work a typical figure).

W. L. Cobb used two converted asphalt bins for preparing his S/C mixture, loading soil and stone with a clam and batching the stuff out via a conveyor to a concrete paver.

Scott Construction's method was to clamshell into a batch bin hopper, under which was installed a converted asphalt pug mill equipped with a spray bar for mixing water. Mixed materials dropped down into a weighing loading hopper, then into trucks in a loading tunnel. Both firms used an 8-yd. hauling scraper and small dozer to clear and strip extensive borrow pits for the soil used, the best soil being that found in a shallow "peel" some 15 in. thick.

An ordinary widening plow was used in preparing the widening trenches.

Both contractors and the Georgia state staff contributed to the design of a special spreader box which proved very useful in placing the 30-in. widening strips. As shown in the photo, W. L. Cobb's box consisted of a stout sheet iron frame 30 x 72 in. with beveled "splash boards." It is so built that after being filled with the contents of one dump truck, it is towed along the shoulder trench, leaving an accurately formed prism or ribbon of loose mix struck off to proper height.

The special value of this outfit was that it avoided wasting of soil-cement material and aided in equalizing amounts of materials to attain established line and grade. Two steel blades fastened on the outer side of the box pulled loose shoulder earth into place against the vertically formed edge of the loose mix. The box was towed by a tractor or patrol grader, pulling inward to keep the box hugging the pavement edge (preferably the grader since the tractor pads tended to slip on the hard surface).

Experience on this project showed that probably an 8 ft. box length would have speeded the work, having more nearly the capacity of one dump truck load. While this method of spreading saved considerable labor; still, two or three men were needed to see that the box was properly filled, keep a windrow of loose earth in position for the side blades and to complete backfilling against the freshly placed strip.

Immediately behind the spreader mounted on one wheel of a farm tractor a raglan sheepsfoot roller packed out the mixture. Following the sheepsfoot the dual tires of a loaded water truck were used to smooth the surface. The completed soil-cement surface was bladed to grade, then slightly wetted intermittently during the day, and covered with moist earth which was kept moistened for seven days. Before applying bituminous cover all soil-cement areas were cleaned of all dirt and dust, using a patrol, blower and power broom.

The Scott contract included 3200 lin. ft. of 5½-ft. widening strip through a village where standard mixed-in-place soil-cement methods were followed.

Georgia Resurface Practice

As the first step in the blanketing operation, patched areas and widening strips were given a tar prime and the old pavement tack coated with an R. C. A black-top paver (11 ft. spread) first put down necessary leveling and super-elevation course, usually a one-lane operation. Then plant-mixed binder and surface courses were spread and rolled to 1½-in. minimum combined thickness.

Partial List of Quantities

Combined quantities for two contracts covering 22.78 miles of work, included the following:

44,284 sq. yd. concrete pavement removed.

96,295 sq. yd. 8 in. cement soil bound macadam base for patching and widening.
6,098 tons asphaltic concrete leveling course—binder or black base mix.
1,686 tons asphaltic concrete black base for superelevation.
25,134 tons hot asphalt concrete binder.
7,582 tons modified Topeka Mix (type 2) surface course.
8,843 bbl. portland cement for soil bound macadam base.
9,912 lin. yd. stabilizer aggregate for soil bound macadam base.
89,000 cu. yd. common and borrow excavation for shoulders, etc. (Incl. new 4,000 ft. relocation).
13,585 gal. bituminous prime for patching.
930 tons hot asphaltic concrete binder for patching.

Scott subcontracted the asphalt work to E. Jack Smith of Atlanta. D. B. Scott acted as superintendent on the Scott contract and M. R. Dempster on the W. L. Cobb section. E. D. Reed was project engineer for the Georgia state highway department, of which Ryburn G. Clay is director and George T. McDonald chief engineer.

Indiana's Postwar Highway Program

Conferences are being held by the state highway commission of Indiana for discussion of postwar road plans with municipal and county officials and interested civic groups in a number of cities throughout the state. Members and engineers of the commission are attending the meetings to learn the needs for improvement in the cities to be visited and the surrounding area.

Members of the commission have announced that work is progressing rapidly on plans for Indiana's postwar highway program which is expected to cost an estimated \$160,000,000. Engineers in the various district offices of the highway department were brought into the central office in Indianapolis during the winter months to assist in the work. However, these engineers will return to their districts as soon as the spring construction season opens.

AIRPORT IN THE MUSKEG



"Hottest" in priority and push among 1943 construction jobs in Northwestern Canada were the U.S. Army's airports and landing strips

SOON after Pearl Harbor it was seen that more and larger all-season runways would be required in connection with military air operations between the United States and Alaska. Early last year the War Department swung into action on a program to enlarge certain existing fields and build additional strips with all possible speed. As with other construction work in the North, the first problem was land transportation. You can deliver a dismantled shovel or two by cargo plane, or filter workers northward, 20 at a clip, but stockpiling say a million gallons of asphalt or a hundred thousand sacks of cement in the wilderness requires truck roads!

And here is where the Alaska Highway has really begun to fulfill its destiny. All through the past season thousands of tons of airport building materials and equipment were hauled along the road, and more thousands of tons of gasoline, lubricating oil and aviation supplies were shuttled over Alaska Highway's rough construction grades.

Airport "X", Up Alcan

An idea of some of the construction problems and design features of a typical north-country airport is given in the following first-hand notes, on an unidentified field along the Alaska Highway. This project included a 1,600-ft. runway extension,

By **HAROLD J. MCKEEVER**
Editor, Roads and Streets

a new 150x5,800 ft. runway and a long taxiway, all black top, and a concrete apron. At the time of my visit last August work was in full swing, with about 275 men engaged on runway grading and extension, asphalt plant erection and hangar construction. Convoys of materials and supplies were arriving daily from the rail head hundreds of miles to the south. Air freights had just whisked in 120 tons of urgent machinery and parts in six days' time. Received also by plane and relayed to another field farther north were knocked-down members for thirty big timber hangar trusses.

The first job here of course was that of clearing several hundred acres of dense jack pine. The trees, being small and shallow rooted, were easily walked down by dozers. The real difficulty, as on the Alaska Road was muskeg and generally soft going. The site selected is on a shelf along a large river. Although it was the best ground available, a considerable part of the area was swamp, and two draglines and a clamshell on mats were needed to assist the tractors in clearing and in digging drainage ditches.

(Above): Grading for a mile-long taxiway on an airport "up along Alcan." Sandy-loam here is being peeled up a spread in 500 to 1,500-ft. hauls by three scrapers

So often it wasn't funny, a machine would slide off the mats, and a light tractor with winch line had to help get the crawlers back on the boards. In spots where the going was better, dozers pushed mountains of felled trees and trash to the clearing edge.

Yes, Scrapers Moved Muskeg

Grading for the 75x6,500 ft. taxiway (located at the worst end of the field), required removing muskeg and black topsoil 3 to 8 ft. down, to the tune of 30,000 cu. yd. of peat, and backfilling with sandy loam borrow. On this strip and on the new runway, a fleet of heavy scrapers went into muskeg and gave a good account of themselves, although old-timers said it couldn't be done. Usually the tractors were able to navigate for only about two hours each morning, after which the ground became so soft and slick that it had to be abandoned for a day to dry out. Much ground would look solid before going into it, but in the words of one tractor operator, "first thing you knew I could reach out from my seat and touch mud."

"Quicksand" or unstable waterlogged spots sometimes were encountered 10 or 12 ft. down. The runway extension required 10,000 cu. yd. of mucking out, but the new runway with its 750 ft. berm cross-section was located over relative good ground involving shallow scraper work and some filling with "select borrow."

Patches of August Frost

Occasionally too, the dragline would strike patches of frost only 2 ft. down. Local areas of standing water were tell-tale signs of ice-locked drainage, since the Army's wells struck ground water 60 ft. down at this airport.

Other dozers in the meantime cleared and stripped a huge borrow and gravel area, found just beyond the end of one runway. Two 1¼-yd. shovels, loading hopper and gravel plant were set up and a haul road built.

Subdrains reflected the war emergency in that they consisted of untreaded timber boxes. Trenching for drains and backfilling were handled with a dragline or clamshell. No attempt was made to install drains below deepest frost.

The 750-ft. graded berm for the new runway was built up with a minimum of 4 to 6 ft. of selected material. In order to blanket over quicksand and material and keep out surface infiltration, the first layer of fill consisted of impervious clay. This layer, compacted separately, was accurately sloped to a 2% transverse grade to act as an under-surface drainage plane. Porous sandy material was then used to bring the fill up to grade. Compaction of sub-base and base was accomplished by a combination of sheepfoots, a pneumatic towing roller, fully loaded dual-tired 5-ton trucks and smooth asphalt rollers—in short every kind of equipment available in the area.

Black-Top Runways

Runways here and also the taxiway drain to one side only, toward parallel box drains and sand-covered laterals, placed 4 ft. down. Transverse and longitudinal grades are both 1% minimum.

The 150 ft. wide runway consisted of 18 in. of packed stabilization plus 3 in. of hot plant-mix. The contractor's modern paving outfit included a 100-tons-per-hour asphalt hot-mix plant, black-top paver, rollers, etc.

(Upper): Compaction was obtained with a combination of tamping and smooth rollers, a rubber-tired "wobbly," and loaded dump trucks moving at 5 mph.

(Middle): Acres of dismal muskeg had to be excavated with clamshell or dragline, scrapers helping whenever possible. It took the boys half a day to get this machine back on its mats.

(Lower): Metcalf-Hamilton-Kansas City Bridge Companies, Engineers and Constructors, had a modern grading outfit, and no pains were spared to keep it greased and in good running condition.

Equipment used on runway and taxiway grading comprised the following:

- 2 Woldridge 15-yd. scrapers
- 6 Gar Wood 10-yd. scrapers
- 1 Gar Wood 12-yd. scraper
- 1 additional scraper (make not determined; stuck deep in mud)
- 8 Allis-Chalmers RD 14 tractors
- 2 Allis-Chalmers RD 10 tractors
- 1 RD 8 Caterpillar tractor
- 5 Adams and Gallion heavy graders
- 2 sheepfoot rollers
- 1 Richardson "Wobbly" roller (pneumatic)
- 2 smooth asphalt rollers (helped on grade)
- 2 elevated graders
- 2 shovels (gravel pit)
- 2 draglines
- 1 clamshell crane
- 10 Thornton dump trucks (for hauling gravel and compaction)
- Jaeger pump

Short of Good Men

Two 11-hour shifts were the rule during the season. As on many another 1943 construction project, this one was slowed down by a shortage of workers and also by the high percentage of over-age workers. Superintendents and foremen were among the unsung heroes. One foreman mentioned having worked 176½ hours in a 15-day period. He had solved some equipment problems in the course of this over-time; for example, seeing to the splicing of a crane boom with angle irons to get the 10 ft. additional length needed to set hangar roof

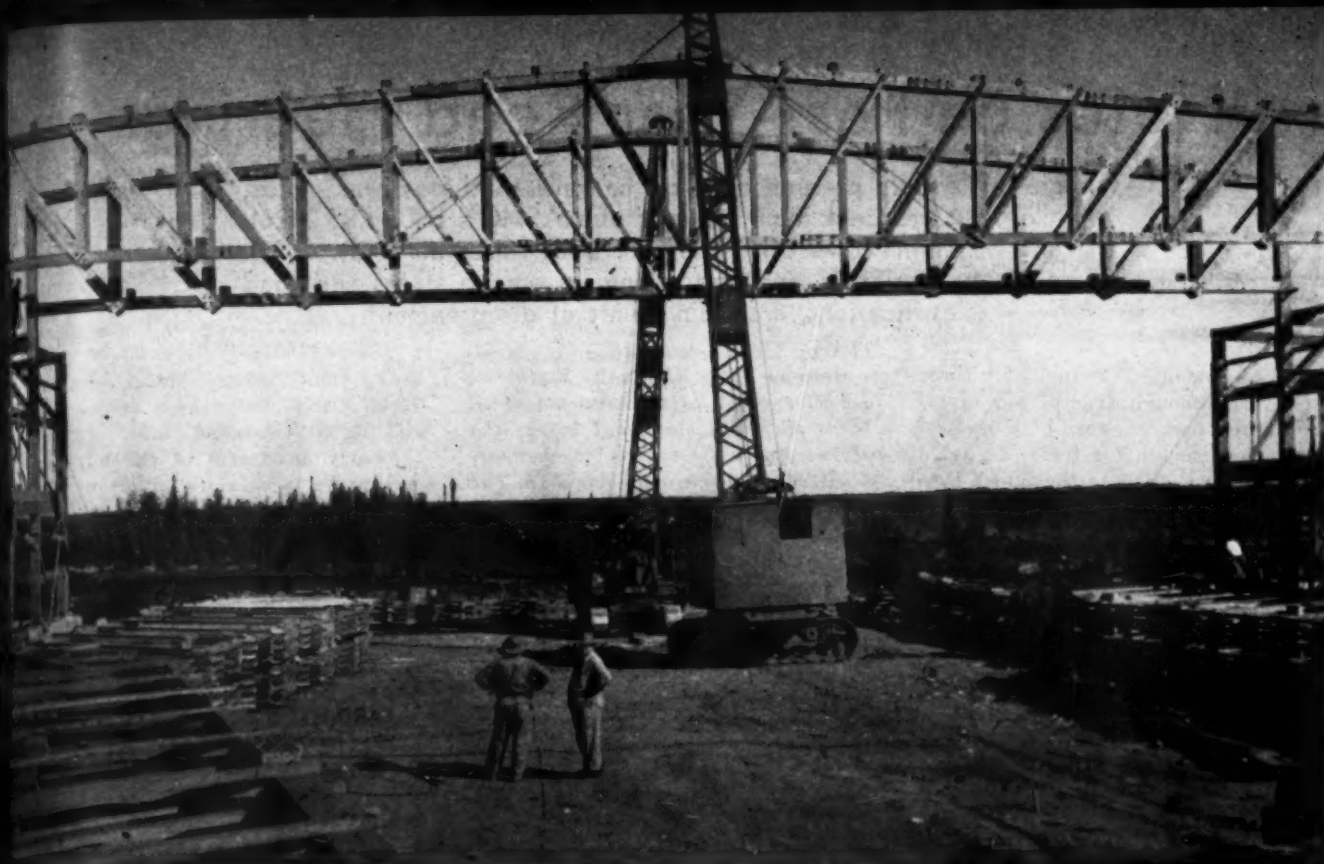


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Setting hangar trusses. Truss members as well as the cranes were hauled several hundred miles up the Alaska Highway. (On a similar hangar job, where the crane boom was ten feet shy of length, a 10-ft. earth ramp or mound was built on the hangar floor to raise the whole machine rather than wait for splicing parts)

trusses. The 1¼-yd. Koehring involved, incidentally, was brought over the Alaska Highway in four days during a wet spell, using a platform trailer and a pusher truck.

The firm of Metcalf-Hamilton-Kansas City Bridge Companies, Engineers and Constructors, were construction-contractors on this and other airports of the region. The U. S. Engineers, Northwest Division, Edmonton, were in charge under the Northwest Service Command.

Rough untreated 2-in. local lumber was used to build subdrains. This line about to be backfilled is located four or five feet down

Road Condition Contest for Maintenance Crews

Maintenance crews of the eight counties in Division 6 of the Ohio State Highway Department engaged recently in a contest to determine which counties road and garage buildings had been best maintained.

The counties were judged on a point system. The condition of the road surfaces, berms, shoulders and ditches, side road intersections, bridges, weed mowing, guard rails, and condition of the county garages were the items or activities upon which they were judged. Points were established for each item and the total was made one thousand for perfect conditions. The point judging system was as follows:

Surfaces:	Points
All Black Tops	
No bumps at bridges	50
Surfaces well and neatly patched.	
Edges, patching in line	250
Concrete and Brick	
Joints and peeling. Carefully sealed and patched, surplus material removed	200
Berms: Free from water holes. Well stoned, graveled, dragged or well sodded	100
Shoulders and Ditches	50
Side Road Intersections: Free from loose material	50
Bridges: General appearance, cleaned bridge seats, gutters. Joints trimmed	50
Mowing Right-of-Way: General neat appearance	50
Guard Rail: General neat appearance	100

County Garage: Garage yard	50
Inside of garage	50
Total	1,000

Franklin and Madison Counties were the winners, each scoring 990 points. No county scored less than 900 points. The trophy, a silver plated highway roller, 3 in. high and 6 in. long, donated by the Galion Iron Works and Mfg. Co., will be in the possession of Madison County for the first six months and then will go to Franklin County.

The contest was initiated by J. Perry Shumacker, Engineer of Division 6. The contest judges were Frank C. Higley, Division Maintenance Engineer; Eugene W. Davis, Division Construction Engineer, and Sam Lintzell, Engineer, Bureau of Maintenance.

Surface Treatment in Indiana

The state highway commission of Indiana will receive bids this month on nine bituminous road surface treatment projects, covering approximately 480 miles of highway throughout the states. Bids on five projects totaling 276 miles will be opened April 18. Bids in the remainder will be received on April 25. The highway commission already has awarded approximately \$4,000,000 worth of bituminous resurfacing contracts for maintenance and improvement work.



Notes on Post-War Road Hearings

Highway leaders present data on nation's road post-war needs. While 44 states back main features of AASHO's bill (H.R. 2426), strong dissenters have other ideas or back Miller bill (H.R. 4170). Size of appropriation, and apportionment among states and road classifications, are main points of disagreement

IS \$1,000,000,000 annually for three years enough federal aid to insure a post-war road building program big enough for traffic needs?

Should we stick to the 50-50 F.A. ratio, or change to 75-25, 65-35, 60-40 or what?

Is the $\frac{1}{2}$ - $\frac{1}{2}$ - $\frac{1}{2}$ formula of state apportionment outmoded, and if so should we change to $\frac{1}{2}$ - $\frac{1}{4}$ - $\frac{1}{4}$, or some more complex method of divvy?

Granted urban traffic problems are serious, what limitations should be placed on the metropolitan share of the pie, and what is fair for the farm communities? Where should the proposed Inter-regional System stand in the picture?

If federal aid is granted for secondary and local roads, how should control be channeled—through the state highway departments or from Washington, D. C., direct to the county seat?

These and other questions were aired in a historic series of hearings before the U. S. House of Representatives Committee on Roads. Before recessing for Easter, eight executive committee members of the American Association of State Highway Officials spoke, followed by state representatives. Thirty-four states were represented by highway department chiefs, three of their congressmen, and eleven by Hal H. Hale, AASHO executive secretary. Important evidence was also introduced by representatives of the American Road Builders Association, American Automobile Association, the Associated General Contractors of America, Inc., Association of American Railroads, National Rural Letter Carriers Assn., and other national and local organizations. Termination of the hearings is expected to include further evidence from Mr. Upham of ARBA and from Thomas H. MacDonald, Commissioner of Public Roads.

Proceedings of House hearings will be made available to the Senate Committee, which had only a one-day hearing.

A selection of the many significant statements is published in the following:

Hadden Urged Early Action

Feb. 29. Samuel C. Hadden, president of AASHO, urged early action

Charles M. Upham, Engineer-Director of A.R.B.A., was scheduled to conclude his statement before the House Roads Committee when hearings reconvened around April 18. The hearings will be concluded with the testimony of Thomas H. MacDonald, Commissioner of Public Roads.

Stressing the importance of highway construction to the national economy, Mr. Upham in his opening statement maintained that prosperity can only be assured when we have a total construction program from 12 to 15% of our national income. This would mean that at our present level of economy the total highway construction program including federal aid should be at least \$3,000,000,000 annually. Total highway needs of the nation in excess of \$16,000,000,000 justify this expenditure.

on H. R. 2426, prepared by the Association, but said that certain fundamental changes would be recommended. He warned that "until Congress acts, state and local governments will continue in the dark in planning post-war highway programs. As matters stand today, we do not know the amount of money that will be available to any unit of government—we are unable to plan improvements. After enactment it will be necessary for PRA to formulate regu-

lations and for state departments to receive and study these before proceeding with detailed plans.

"Early enactment of the bill may well prove to be more important than any one of its provisions—it may be doubted if the sum mentioned (billion a year) will be found adequate now, since it was considered the minimum needed a year ago. During that year highway revenues have steadily decreased, highways have deteriorated, and we have recently had proposed a nation-wide system of Interregional highways."

"Our program," continued Mr. Hadden, "is in no sense 'made work' since the job is necessary whether we have unemployment or not."

White and Brown on Rural Needs

March 1. Provisions of H. R. 2426 were endorsed by State Highway Chief Engineers Fred R. White (Iowa) and C. W. Brown (Mo.). Mr. White emphasized needs of secondary and feeder roads, saying that secondary roads carry 34.5% of all traffic, serve 52% of population, and are the farmers' lifeline.

Last October, state departments estimated that minimum rural secondary road needs total \$3,289,000,000, urban highway needs \$2,534,000,000, and F. A. road needs \$5,315,000,000. Of \$11.1 billions, rural secondary needs thus constitute 29.5%.

Amendments Proposed for H.R. 2426

Samuel Hadden, president of AASHO, has proposed these amendments to the pending post-war road bill H. R. 2426:

1. Advance Federal payments for right-of-way acquisition to the end of the war.

2. Apportionment of \$450 million a year for each of the first three post-war years for Federal Aid primary routes; \$250 million for secondary Federal Aid roads, and \$300 million on arterial urban routes.

3. The apportionment for Federal Aid routes on the historic formula of $\frac{1}{2}$ based on state area, $\frac{1}{2}$ on post-road mileage, and $\frac{1}{2}$ on state population. Apportionment of the urban funds on a population basis, counting only cities over 10,000 population.

4. Right-of-way costs would be eligible for Federal Aid, but land and property damage costs would not.

5. Federal legislation to insure the right of states to acquire limited-access rights to land for highways.

6. A \$50 million authorization for Federal forest highways and \$25 million for forest development, roads and trails, for the first three post-war years.

Adding the secondary road needs of cities below 10,000, said Mr. White, it appears that one-third of any federal post-war road funds should be earmarked for secondary and feeder roads. (Under H. R. 2426, 29.1% of each \$1 billion would go thus, or \$291,000,000.) But he questioned the advisability of such a measure as S. 1498, the "local rural roads bill" (S. 1498 would authorize \$375,000,000 a year for three years for secondary rural roads and would set up a new agency, the "Rural Local Roads Administration.")

Missouri Needs Quarter Billion

Chief Engineer Brown of Missouri said his State's highway needs, first three years after the war, will total \$135,600,000. Missouri, by the end of 1944, will be \$47,000,000 behind on regular state road construction, due to wartime curtailments; rural road construction deficiencies will total \$53,400,000; and necessary urban road construction, \$35,200,000. Missouri's 10-year road needs, assuming start in 1945, is \$263,350,000.

March 2. Herman A. MacDonald, Comm'r., Massachusetts D. of P. W.: "Cities are our greatest traffic potential and our greatest traffic bottleneck," he said. "After the war, urban congestion will be more severe. The Federal Government should assist in providing principal routes through cities." By-passes are needed around smaller municipalities and arterial trunk-lines and express or limited-access highways to get traffic into the cities, he said.

Most cities today cannot finance major highway programs—relief from State and Federal sources is essential. In Boston alone \$35,000,000 should be spent to eliminate very serious congestion. (Pennsylvania plans to spend \$43,000,000 in Philadelphia and \$20,000,000 in Pittsburgh, plus \$95,000,000 for urban by-pass routes.) Massachusetts was said to have plans ready now for projects costing \$9,000,000 and to expect to be ready for \$35,000,000 by 1945.

California's present total in the plans stage, according to C. H. Purcell, Dir. of P.W., is \$16,000,000 and the year-end objective, \$35,000,000.

March 3. J. S. Williamson, chief highway comm'r. of S. Carolina, told that a questionnaire survey of 48 state highway departments disclosed that only three States would be in a position to carry out a program on a 50-50 basis. Only six States, Mr. Williamson said, indicated they would have difficulty in supplying funds on 25% share or less. In some cases this situation can be remedied by state legislation.

Mr. Sours, Ohio Director of Highways, emphasized belief that funds should be allocated by formula rather than on a so-called need basis. A "need" plan, he said, could readily lead to pressure and favoritism not reflecting accurately actual highway needs.

At the same time, he said, recognition should be given to the need for urban highway developments, particularly the trunklines and expressways through cities and their principal feeders.

Program Not Big Enough

March 4. T. H. Cutler, state highway engineer of Kentucky, said that great danger lies in a "lack of realization of the size of the job to be done." Studies made so far were said to indicate that construction costs based on present highway needs far exceed the amount proposed in H. R. 2426. The amount of funds made available will in most cases determine which ones, of the many needed projects, can be considered for immediate post-war construction."

Ezra B. Whitman, chairman, Maryland road comm., expressed belief that Federal participation must include right-of-way costs. Terming difficulties in acquiring right-of-way the "greatest single obstacle to needed road improvements," he said these difficulties delay construction and increase costs.

March 6. W. W. Mitchell, Arkansas road chief, said his state has a post-war program comprising 2,165 miles of highways, 20 major bridges and 50 railroad grade separations; 650 miles of highways and 15 structures being on the F. A. secondary system. \$225,000,000 will eventually be required.

Mr. Mitchell eloquently pictured the typical road need by saying: "Many of our trunk highways now have unpaved gaps, and further, since 2,001 miles of paved surfaces are less than 20 ft. in width, with 304 miles of concrete and 290 miles of bituminous surfacing over 15 years old, all either obsolete or seriously deteriorated, it is our considered judgment that an additional program of \$60,000,000 or more, based on 75% Federal funds is imperatively needed for replacements and improvements."

Arkansas during the emergency has accumulated construction funds and earmarked them for the post-war period.

Describing Alabama's needs, state highway director George R. Swift said \$182,000,000 would be required to reconstruct and complete its F. A. System to modern standards.

Cox of Connecticut Backs H.R. 4170

March 6 and 7. Another bill, H.R. 4170, introduced by Rep. Miller of Connecticut, was endorsed by Wm. G. Cox, Connecticut highway commissioner. This measure also provides for \$3,000,000,000 on the regular 50-50 basis. But he thinks that appropriation should be \$2,000,000,000, states matching for a \$4,000,000,000 total program. He said the country's real road needs exceed that total but that this expenditure would provide a "satisfactory return to the public" and would "strengthen the country's economy."

The Miller bill would authorize: \$600,000,000 a year on the basis of number of persons demobilized from military and industrial services, to be expended on Interregional system; \$200,000,000 a year apportioned on regular formula, for primary and secondary systems as states elect; \$200,000,000 a year, apportioned on motor registrations, for roads and streets not on the F. A. systems.

March 8. Post-war needs were outlined by seven state officials. Consensus: needs in most instances would far exceed funds available under H.R. 2426.

Reporting that a recent inventory shows need for \$256,250,000 in improvements, Wesley W. Polk, Illinois chief highway engineer, said the need included \$123,770,000 rural primary, \$114,980,000 urban primary and \$17,500,000 secondary. Many miles of Illinois primary roads are over 20 years old, some more than 25.

Fred White of Iowa appeared again, presenting Iowa's total needs at \$463,000,000. He said H.R. 2426 would provide funds for only one-fifth of total Iowa requirements.

R. C. Keeling, Kansas state highway engineer, estimated his state's post-war needs at \$384,939,934 and expressed concern that no change be made in present method of apportioning F. A. funds.

"When we know that 4 out of every 10 U. S. communities depend entirely on the highways for both passenger and freight service and that 257 billion passenger-miles, (90% of total), are annually handled by our rural highway system, we believe that the real Number One road problem is still primarily rural in character," said Mr. Keeling.

March 9. A \$3,000,000,000 federal highway program is justified on grounds of national economy, Edward W. Staves, vice-chairman of the Massachusetts Post-War Commission, told the Committee. Reasons: (1). It is self-liquidating; federal gas tax and imposts during the period will exceed the appropriation. (2). The new urban

features will insure work to unemployed in a reasonable ratio to population. (3). Highway construction is most profitable type of public works in turnover of economic dollar (for every \$1 spent, \$4 put in motion on a national scale). (4). Direct benefit to highway users is sufficient to warrant the appropriation even if not self-liquidating. (5). With nearly 40 million car registration ahead, services to motorists should be paramount to all other public improvements, and no greater medium of national safety can be conceived.

Mr. Staves opposed the 2426 formula, also the existing one. On 2426 he said, "We are unable to reconcile a tax of \$107,000,000 with a reimbursement of \$54,000,000 while our immediate needs for highway improvements are \$200,000,000.

R. H. Baldock, Oregon chief engineer, said his state is satisfied with H.R. 2426. If a change is made to meet urban needs, he suggested providing 30% for urban areas, apportioning on urban population basis, under regular F. A. formula; and a separate fund for Federal forest roads, \$50,000,000 highways and \$25,000,000 development roads.

Robert Moses Warns Again

March 10. A \$5,000,000,000 total program was recommended by Robert Moses, New York City Park Commissioner and member New York City Planning Commission, who proposed 60% federal participation. He said that "as to unemployment, we are headed straight for made-work and a handout unless we have ready a sizable program of public works, headed by a large road program.

"My own belief is that, although the time is short, we can still prepare contract plans for about \$15,000,000,000 in public work within two to three years. The combined Federal-State highway program should represent four to five billions of the total. The keystone of the arch is the highway program. Without it there can be no sensible extension into other fields of public works."

"Charles M. Zeigler, Michigan state highway commissioner, said nearly 90% of his trunkline system is inadequate and must be replaced soon as possible. The State is working on plans totaling \$120,000,000; Michigan counties have a \$136,500,000 and cities a \$150,800,000 program.

March 11. Hal G. Sours, Ohio, told of his state's needed modernization and repairs to cost \$450,000,000 and was making a good progress in programming. Development of trunk routes in and through cities and reconstruction on arterials constituted Ohio's greatest needs.

Among other state highway leaders appearing March 11, was Charles Ross of N. Carolina, who endorsed the present F.A. set-up, saying, "We believe that no finer demonstration of the proper relationship between the Federal Government and the States can be found anywhere." "The Federal Government, through highly skilled personnel, has improved the standards and encouraged sound business methods of contracting and construction, and the States have been left free to a large degree in selection of projects and adjustments of roads to local needs and necessary political considerations."

March 13. Estimating Texas' requirements at \$768,000,000, D. C. Greer, state highway engineer, said his State approved H.R. 2426 and would be ready to match Federal funds on any basis. "What we want in Texas is roads, roads and more roads," he said after emphasizing the "great distances" in his State. "We are ready to give dollar for dollar value for all money expended."

March 14. While representatives of four other States endorsed the general provisions of H.R. 2426, Spencer Miller, Jr., New Jersey Highway Commissioner, stressed alleged defects and favored H.R. 4170. In favoring 50-50 matching, he said state fiscal conditions are better now than in the past decade, and "it is impossible to argue that States cannot furnish at least an equal share. The Federal appropriation should start at a smaller percentage the first year and step upward in the subsequent years."

March 15. John U. Shroyer, Pennsylvania Secretary of Highways, outlined suggested changes in H.R. 2426. Pennsylvania agrees with the \$3,000,000,000 total, he said, "looking on this as a return of proceeds of specific taxation upon the motorists for highway development." But a 75-25 basis, he said, "may breed and encourage extravagant designs and construction in many States." He recommended 65-Federal 35-State; also distribution of Federal aid one-half on present formula, half on population basis; and for any State to expend up to 50% of its allocation in urban areas and on secondary roads "but not make it mandatory for a State to spend money in a wasteful and uneconomical manner to build or rebuild highways which already meet existing traffic requirements."

Pennsylvania contemplates a \$100,000,000 annual road program for five years.

March 16. Summarizing State-by-State views, Samuel C. Hadden, president of AASHO, appeared again today, saying the great majority of

States believe they should not bear more than 25% of the cost, particularly the first year. Only two States (later four) have "dissented" on H.R. 2426 provisions, he noted and they approve the general program.

Mr. Hadden submitted two sets of proposed amendments to H.R. 2426, but emphasized that the Association's legislative committee has not receded from its support. "Highway officials hope the Federal Government would deal only with the States, leaving to the States the responsibility of dealing with their own political subdivisions." He advised that provision be made for designation of the Inter-regional System. Also that counsel of PRA be obtained regarding off-street parking, flight strips and condemnation proceedings.

Contractors Ready and Able

March 21. An "ultra conservative" estimate was said by H. E. Foreman managing director of the Associated General Contractors of America, Inc., to show that the construction industry has a capacity to undertake a road program at least twice the size of the \$4,000,000,000 proposal. He estimated the present annual capacity of contractors to undertake a highway construction program at \$2,775,000,000.

Mr. Foreman was one of four AGC officials appearing as witnesses. Others were: F. W. Parrott, vice pres. C. F. Lytle Co., Sioux City, Iowa, chairman AGC legislative committee; Morris E. DeWitt of the Porter-DeWitt Company, Poplar Bluff, Mo., vice chairman AGC Highway Contractor's Division; and Fred I. Rowe of the W. L. Johnson Construction Co., Hicksville, Ohio, chairman AGC market development committee. The AGC recommended that "as a safeguard to Federal funds," Congress specify execution of work through the "time-tested contract method of construction."

Upham Urges Larger Outlay

March 22. Charles M. Upham, engineer-director of the American Road Builders' Association, said that total requirements of the Federal-aid system, secondary and feeder roads and city streets indicate an overall expenditure of approximately \$16,500,000,000. He asserted that a minimum expenditure of \$3,000,000,000 annually on a five-year post-war highway program would be not only economically justified but would represent the minimum rate of improvement to meet increasing traffic demands. Mr. Upham has recommended that a special projects fund of \$500,000,000 be added to pending legislation.

(Continued on page 80)

Asphaltic Treatment of Concrete

to resist action of snow and ice control

By H. D. METCALF

Chief Engineer, Bureau of Maintenance,
Ohio Department of Highways, Columbus

THE use of chemicals, such as salt or calcium chloride, for removal of snow and ice during the winter has been used to a considerable extent by the Ohio Department of Highways and has proved effective and the practice is being continued. Even though some concrete surface scaling is attributed to it, this scaling has been more noticeable on concrete pavement less than four years old. In order to counteract this scaling it was decided to provide a protective treatment to the surface as a means of prevention. Experiments conducted over the last two years indicate that a treatment of linseed oil emulsion effectively retards scaling caused by the action of chemicals. The original plan to treat newer concrete pavements (not over four years old) with this material was discontinued upon request of the Food Distribution Administration, as linseed oil was needed for other purposes during wartime.* It was, therefore, necessary to find a substitute material.

The problem was put up to the

*See article, "Linseed Oil Treatment Against Scaling," by H. D. Metcalf, September, 1943, issue of *Roads and Streets*.

Testing Laboratory and after numerous tests with various materials it was decided to use a modified asphalt primer. The tests were made on concrete cylinders which were put through numerous cycles of freezing and thawing with calcium chloride and sodium chloride. The material selected was a solution consisting of 20% of 85-100 pen. asphalt cement dissolved in a petroleum-type solvent.

This material was sprayed on the concrete pavement with a bituminous pressure distributor at a rate of one-twentieth of a gallon per square yard. Approximately 200 miles of concrete pavement less than four years old was treated in 1943. These roads were located in the northern portion of the state, generally that portion north of US Route 40. Scaling conditions were not critical in the southern section, where chemicals are infrequently used to thaw the snow or ice; 10,700 gallons of the material was applied at an average cost of 0.9c per sq. yd.

The color of the pavement is almost black immediately after treatment. However, this gradually fades out to a gray after a few months' time and is not objectionable in appearance.

befriended by a local school principal who asked Charles to leave some sample drawings with him for a few days. The teacher took the drawings on a train to New York. Somewhere along the way, however, the teacher became absent-minded and left the sheets somewhere enroute.

After other bad breaks, young Hick finally went to Syracuse and was hired as a draftsman. Then followed a couple of years of plotting water lines and getting other excellent grounding experience. A slack period in 1894 left him without a job, but finally he received a letter from his home town. Mount Vernon, it seemed was planning a large public works program and wanted an engineering department of its own for the work. The opportunity looked good to Hick, and he found himself at work as a combination draftsman, chainman, and rodman.

In 1906, to cut this story short, he became city engineer of Mount Vernon—and is still on the job.

During his half century of labor with the city he has designed and supervised some \$20,000,000 of public works. At present his eyes are on the future, and his major effort is directed toward a \$3,000,000 post-war program of public improvements.

Today he still walks with a military bearing and is eager to continue his unselfish work. Although holding the esteem and respect of a host of his townspeople, we doubt if more than a passing few can fully realize the measure of public good that such men as Charles Hick have been able to render by doing each day's tasks efficiently and with practical vision.

He's Served His Home Town for Fifty Years

Meet Charles Hick, a city engineer with a remarkable record for public service

ALL started back in February, 1874, when a youngster was born in the then little village of Mount Vernon, New York. Of course, no one then could have foretold it but this newcomer was to leave his stamp on every street in town and influence the welfare of every citizen.

Young Charles Miller Hick, as his parents named him, attended local schools and at an early age revealed a bent for mathematics and mechanical drawing. Later at Bordentown Military Institute he continued to excel in this direction, along with demonstrating prowess on the baseball diamond.

At eighteen he set out to look for a job. According to reminiscent data furnished by an associate, Herbert



Charles M. Hick,
City Engineer, Mount Vernon

A. Cordes of the Mount Vernon Department of Public Works, while Hick was home on a vacation he was

By-Passes and Urban Traffic

A survey by the Public Roads Administration shows that in towns of 2,500 or less population about one-half the traffic is bound to the heart of the cities but in municipalities ranging from 10,000 to 500,000 population only a small percentage of the traffic would use by-passes.

In the cities surveyed it was found that in the 25,000 to 50,000 population class 79 per cent of the traffic was bound into the city and 21 per cent would use by-passes; in the 100,000 to 300,000 population class 81.6 per cent of the traffic was headed for the heart of town while 18.4 per cent would use by-passes. In the 300,000 to 500,000 population range 92.8 per cent of the traffic was bound into the city and only 7.2 per cent would use belt lines or by-passes.

★ ★ With Road Builders in Uniform ★ ★

From the South Pacific to England and from the Aleutians to Burma you'll find them serving today . . . the thousands of road builders who've gone out from contracting firms, state highway departments, and county, city and federal engineering posts. Here is news of a few of them. More next month. Send us your items!

Clyde C. Colwell, with the Minnesota Highway Department since 1921, and District Engineer for the South-eastern District from 1937, was called as Captain in the National Guard early in 1941. After training he left with the 194th Bn, Field Artillery for Africa. He is now Lt. Col. Colwell in command of that unit in support of the 34th Division, somewhere in Italy. Colonel Colwell enlisted in the National Guard in 1915, served with the Third Infantry on the Mexican border and was later with the 125th Field Artillery. In World War I he served with the 125th and 126th Field Artillery in France.



Lt. Col. Clyde C. Colwell of Minnesota

Don L. Baker, now a Captain, Engineers School, Fort Belvoir, Virginia, was a former partner of the Baker & Hickey Company, railroad and highway bridge contractors, Columbus, Ohio. Captain Baker is a member of A.R.B.A. and the Ohio Contractors Association, and is well-known in the construction fraternity in Ohio.



Don L. Baker

Captain T. C. Adams, 1,889th Engineers Aviation Battalion, Davis-Monthau Field, Tucson, Arizona. Former Division Engineer, Toledo.

Lt. Frank M. Williams, located at Fort Monroe, Virginia, with Coast Artillery Corps. Formerly Executive Assistant to Director H. G. Sours.

Lt. Col. H. S. Perry, Post Quartermaster, Camp Breckenridge, Kentucky. Former Assistant Chief Engineer at Maintenance.

Lt. Col. R. R. Litehiser, F.A., Staff and Faculty, Command and General Staff School, Ft. Leavenworth, Kansas. Former Chief Engineer, Bureau of Tests.

Lt. Walter Fleming, Civil Engineer Battalion, U.S.N.R., Camp Perry, Virginia. Former Assistant Chief Engineer of Bridges.

Lt. G. A. Berry, Corps of Engineers, Assistant Post Engineer Advanced Twin Engine Flying School, Seymour, Indiana. Former Assistant Chief Engineer, Bureau of Location and Right of Way.

Among Kansans in Service

Kansas Contractors Association, according to engineer-secretary J. W. Ballard, at Topeka, has the following names in its Honor Roll:

C. A. Tucker, Cook & Tucker, Ottawa; Leon Sherwood, A. G. Sherwood Const. Co., Independence; Claude Rhoades, Rhoades Construction Co., Newton; Don Wilson, with D. G. Hansen, Logan, Kan. (now Box 284, San Clements, Calif.); Dwight Hardman, with D. H. Hardman, Alton, Kan.; Lloyd, Dale and Clare Miller, San Ore Construction Co., McPherson; Joy Sherwood, Sherwood Construction Co., Wichita; Richard B. Koss, Koss Construction Co., Des Moines, Iowa.

K. D. Hauser, of Hauser Construction Co., Portland, Ore., a well known "heavy and highway" firm, is a Lt. Colonel, Corps of Engineers. He served 14 months in Alaska and recently left for foreign service attached to the 2nd Military Railway Service. Lt. Col. Hauser was an AGC chapter director and also a director in the National AGC.

Many Alabama Road Builders Now in Service

From G. R. Swift, State Highway Director of Alabama comes the following reminder of the prominent part many former highway engineers and officials are taking in military service.

"Over five hundred members of the Alabama Highway Department are now in the armed services," he writes, "all of whom we are proud of. Only one has been killed that we know of (Feb. 4), while two are German prisoners. Several have been decorated. . . . Since December we have been sending service members a monthly letter."

Among ex-Alabama state road men are the following whom many Roads & Streets readers may know:

H. H. Houk, former chief engineer. He was nine years in the Philippine Islands as engineer for the Philippine Government. Bridge engineer for department, 1933-35; chief engineer, 1935-39. Later airport engineer for C.A.A. on National Airport, Washington, D. C. Entered the Navy as lieutenant commander in July, 1941. Now a commander, CEC-USNR (Seabees) and has seen active service in the South Pacific area constructing landing docks, roads and landing strips. Mr. Houk has sons in service.

W. P. De Jarnette, division engineer, now on leave, entered service early in 1941 as major and was at Mobile, Ala., with U. S. Engineers as chief of engineering. Is now Lt. Col. Jarnette after attending staff command school at Leavenworth.

H. H. Hanks, division engineer on military leave, is a 1st lieutenant in the Army Engineers.

Graham P. Willoughby, former bridge engineer and now on leave, is now a lieutenant (s.g.), CE-USNR (Seabees) and after preliminary training was sent to the South Pacific.

H. D. Burnum, also a division engineer and former commissioner, on leave, and a World War I vet, is a lieutenant commander in the CEC-USNR. Now in the South Pacific. Has a son in the Army.

Chris J. Sherlock, highway director from 1939 until 1942 and World War I vet, entered armed service in the summer of 1943



as a major in the Corps of Engineers, Army. Is now working on the Alcon Highway. Worked with the State Highway Department from 1922 onward with exception of three years. Mr. Sherlock became nationally prominent as president of ARBA in 1942-43 (and former board member), vice-president of AASHO in 1940-41 and vice-president of the Southeast Association, State Highway Officials, in 1941-42.

Marvin Taylor, who was state maintenance engineer, 1939-1943, and long-time employee, is now a captain

in the post engineer's office at Camp Maxey, Texas.

Leon Gottlieb, former bituminous engineer with the state, is now a major and taking a course at Oxford University in England. (Major Gottlieb writes that he has learned to place penetration at all times of the day and night and in rain, sleet and cold weather.)

Atlanta Construction Department Proud of Its Service Flag

Clarke Donaldson, among other accomplishments in his long career as Chief of Construction, City of Atlanta, Georgia, has made a reputation as a trainer of men. Nothing reflects this fact more clearly than the galaxy of high ranking officers among his department's military absentees.

These include Lt. Col. Rex W. Lefevre, formerly with the city 16 years and now with 551st Signal Air Warning Battalion in the South Pacific; Lt. Col. Ray A. Nixon, 19th Corps Artillery, Camp Gordon, Augusta, Ga., who was ass't. engineer of streets of Atlanta; Major J. K. Boll, Artillery School, Fort Sill, Okla., former ass't. eng'r of sewers; Major G. F. Steele, former street assistant; Capt. W. R. Walker, once ass't. bridge engineer, now in England with the Engineer Service, APO Postmaster, N. Y.; Major Wyant Bean, now at Fort Sill; and Capt. R. W. Respass, Post Engineer, Tyndall Field, Panama City, Fla. The list includes half a dozen other commissioned and a dozen enlisted men.

Ohio contractors report a lot of sons in service, most of whom were formerly active in their father's firms.

George B. Brode of the W. M. Brode Company, Newcomerstown, Ohio, has two, officers in the S. W. Pacific. R. J. Dienst, 297 South High Street, Columbus, has one. D. R. Smalley of Hinton & Smalley, Celina, has several sons in service; one died in an air crash in Texas. Other service sons: Arthur Miller of Holmes Construction Co., Wooster (two); Carl H. Stander of Mansfield Asphalt Paving Company, Mansfield, Ohio (only son). The sons noted are, generally speaking, officers and were formerly associated with their fathers in the road building business.

Colorado contractors now in uniform include the following, reachable by mail as noted:

Ernest W. Everly (Lt. Col.)—516 S.W. 4th Ave., Mineral Wells, Texas; Glen Gately—Gately Motor Company, Alma, Colorado; D. H. Hardman (Commander)—% Mr. Paul E. Thompson, Alton, Kansas; Ed. H. Honnen—Ed. H. Honnen Constr. Co.,

P. O. Box 92, Colorado Springs, Colorado.

Capt. S. T. Brush, former district engineer with the Cook County highway department, is reported by chief engineer Duncan Campbell as being with Co. F., 347th Engineers, A.P.O. 640, % Postmaster, N. Y. C. Another once district engineer, is Capt. Hugh McAniff, CE. 0-924176, A.P.O. 7128, % Postmaster, N. Y. C.

Major Hugo G. Erickson, former paving engineer of Minneapolis, is stationed at the Santa Ana Air Base, Calif. (904 No. Flower St.). Ralph Sprungman, former traffic engineer, is serving at Fort Lawton as a Lt. 7th Traffic Regulations Group.

West Virginia Road Men in the Service

Up to Feb. 1, 1944, 686 employees of the West Virginia State Road Commission had answered the call to the colors. Two had been killed in action: James Foster in Sicily in September, 1943, and Paul Wolfe in North Africa in February, 1943.

We are indebted to William T. Brice, Director of Public Relations of the Commission, for the following information on some of the former engineers:



A. M. Miller



W. C. McCormick

A. M. Miller, formerly assistant Materials Engineer, is a Lieutenant (s.g.) in the "Seabees" and is now stationed somewhere in Alaska.

William C. McCormick, formerly a Bituminous Operator, Dept. of Tests, is a Captain with the Fifth Army in Italy.

Gilbert Coontz, formerly in the Plans and Surveys Division, has been on duty for 3½ years; is now a Lt. (s.g.) in the Navy, executive officer on the Destroyer Escort U.S.S. Fogg. He has been in South America, Africa, Iceland and England.



Gilbert Coontz

Robert R. Summer, from Dept. of Tests, is an Army Captain, now in Hawaii.

J. S. Gillespie, former district engineer, has been in the North Pacific area for the past 16 months with the 45th Construction Battalion Seabees; now a lieutenant.



R. R. Summers



J. S. Gillespie

Thomas L. Stamp, former senior engineer is a Navy Lt. (s.g.) and has served in the S. Pac. area. He was on Guadalcanal and has been overseas for 20 months; still in South Pacific, directing construction on bridges, roads, air fields and buildings.



T. L. Stamp

Illinois Superintendents in Armed Service

Many Illinois county highway superintendents are now in the various branches of the armed services. A partial list of these men follows:

Capt. W. J. Casler, U. S. Engineers (Morgan county); Lt.-Col. Fred Curl, U. S. Army (Moultrie county); Lt. Robt. E. McNeil, U. S. Army (Ford county); C. O. Brownlee, U. S. Engineers (Shelby county); Sgt. Carl Royer, U. S. Marines (Christian county); Lt. (jg) George Caviezel, Seabees (Livingston county); Capt. Lewis E. Barenfanger, U. S. Army (Marion county), and Lt. Fred Sparks, U. S. Army (Wabash county).

New Jersey's State Highway Department Honor Roll records the names of 419 employees who have answered the call to the colors. It was dedicated recently by Commissioner Spencer Miller, Jr., at impressive ceremonies attended by prominent officials.

Gold stars now mark two names: Lt. Robert M. Reed, son of Edward E. Reed, acting ass't. state highway engineer. Lt. Reed, an aviation enthusiast from early youth, died in a bomber crash. He formerly directed presentation of the Department's motion pictures "For Safety's Sake." Private T. J. Murphy, also a valued Department employee, met death in an accident shortly after induction.



General view of plant, corresponding to vantage point "A" in diagram

Carefully Designed Material Plant Speeded Asphalt Runway Paving

ONE of the lessons learned from airport paving jobs over the country is that it pays the contractor to plan his material handling with utmost care. An example of a well designed plant is that erected by the Allegheny Asphalt Paving Company for paving Moon Township Airport near Pittsburgh, Pa. (See Roads and Streets, March, 1944, for general article on grading and paving.)

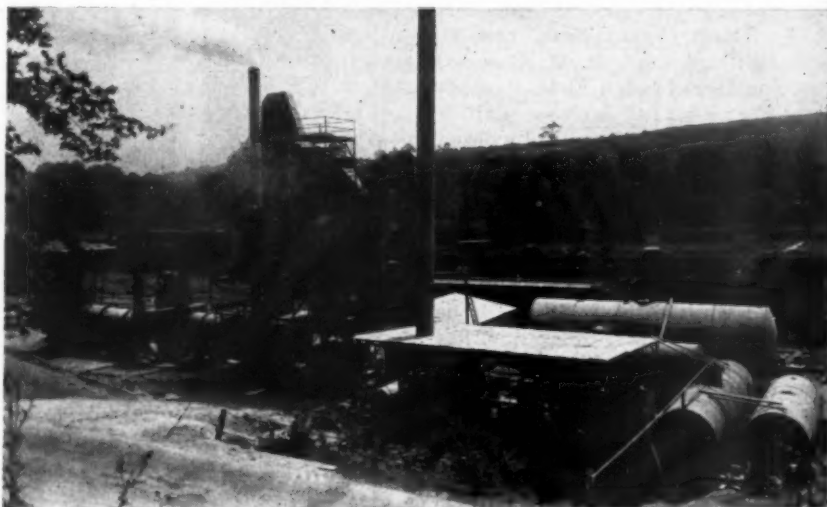
Erected at a convenient rail spur location 3½ miles from the airport, this plant specifically was designed to handle slag and choke screenings for 355,000 sq. yd. of 14-in. slag base (4 rolled courses), and for an equal area of 1-in. bituminous hot-mix topping. The binder-course mix was not involved here but was delivered separately by truck from the contractor's permanent asphalt plant in Pittsburgh 18 miles away. Reported to have cost \$36,000 to erect from equipment already owned by the contractor, the plant handled as high as 150,000 tons of slag daily at the peak.

The hot mix plant (16 in the diagram) was kept at top capacity by loading the dryer bin each night with crane (15).

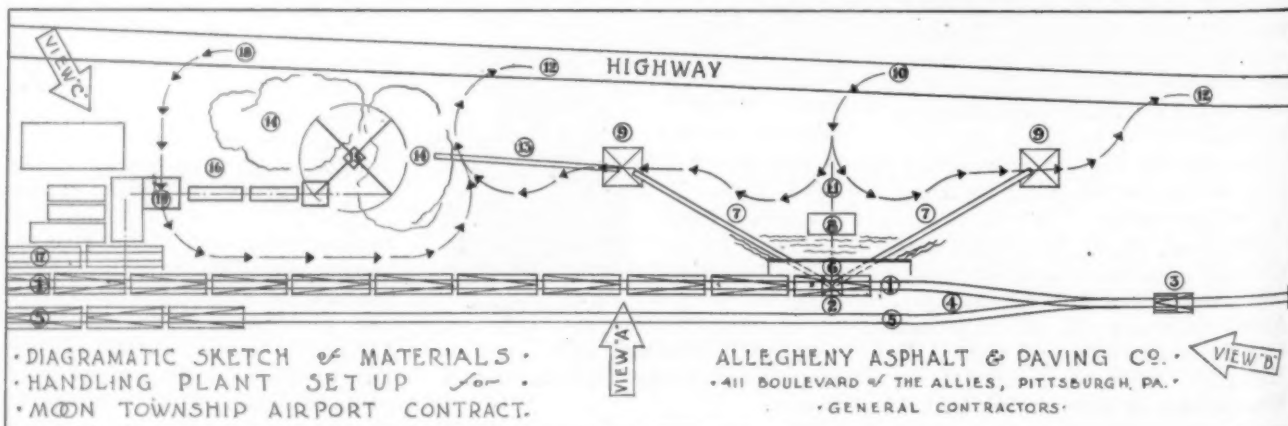
A feature of the arrangement was the use of two belt conveyors at 45°

angles with the track. Briefly, as diagrammed, the plant operation is described as follows:

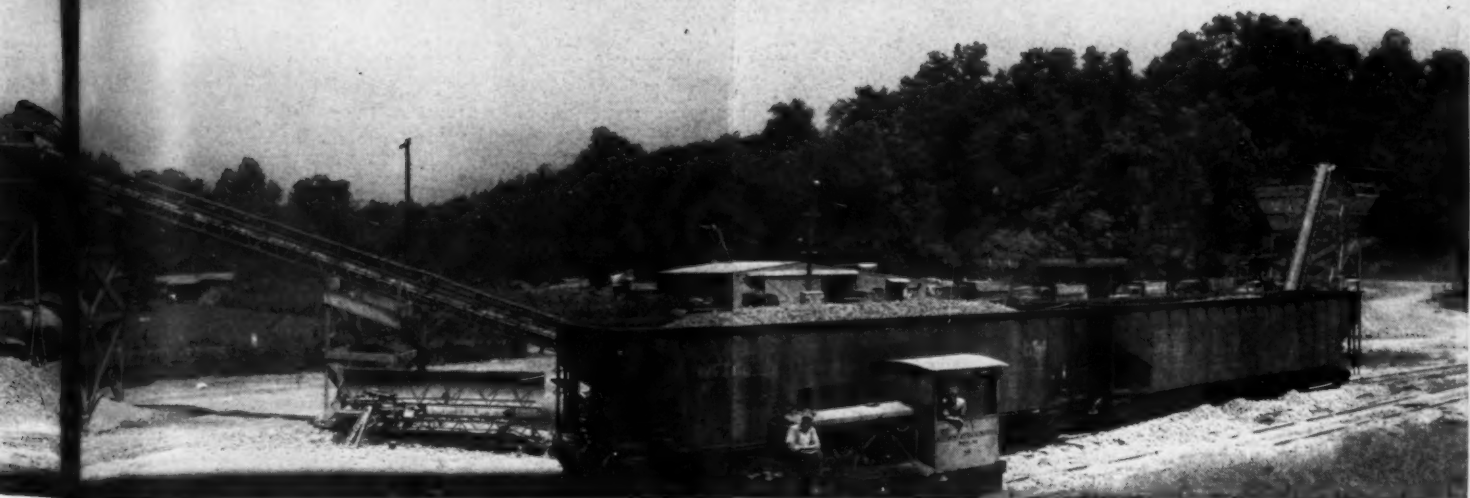
(1) Siding for drifting 60 full cars over track hopper (2). Unloading and switching by diesel locomotive (3)



View of asphalt plant, corresponding to "C" in drawing



dia-
de-
cars
and
(3)



over crossover switch (4) to go to empty car siding (5). Material drops from track hopper (2) into feeders (6), supplying 120-ft. belts (7) powered by diesel-electric plant (8) and discharging into truck-load bins (9). Stabilization material trucks enter from highway at (10), pass dispatcher (11), load under bins (9) and enter highway at (12) for return (3½ mi.) to site. Auxiliary belt (13) supplies stock piles of aggregate (14) from which crane (15) charges portable asphalt plant (16), to which asphalt and dust cars deliver by spur (17). Trucks enter at (18), load under tower (19) and leave at (12).

Additional facilities, including an equipment park, shop, store, office and service station, were set up immediately across the parallel highway.

Use of Rock Salt in Winter Maintenance at Easthampton, Mass.

Rock salt has been the solution to the troublesome winter maintenance problem on the steep grade of the heavily traveled highway connecting Easthampton, Mass., and the city of Holyoke, Mass. According to George Le Pan, Maintenance Superintendent, Easthampton, this 4/5 of a mile stretch on the Easthampton side of the mountain has been the most difficult to keep safe all through the winter until applications of straight rock salt were used last year.

After the plows have cleaned away the snowfall approximately 700 lb. of salt are evenly distributed on this stretch by shoveling from the back of a slowly moving truck. Within a short time the remaining snow left clinging to the pavement is melted off, and a clean dry ice-free highway is obtained.

Before the adoption of rock salt maintenance trucks attempting to sand the compacted snow and ice very often were unable to get enough traction to ascend the rise, even by back-



Additional view, corresponding to "B" in drawing

ing up. Now when that condition is encountered, the truck is able to proceed forward in low gear as the workmen throw shovelfuls of salt over the cab onto the highway in front of the vehicle. Before the rock salt crystals dissolve they act as an abrasive.

When there has been a heavy snowfall during the night, the maintenance crew of four start work on the hill at 5 a. m. By the time heavy morning traffic begins, salt has melted the snow on the road and cars can ascend the steep grade without danger of slipping. Used in this way, rock salt has made possible considerable saving in manpower and money, because hitherto large quantities of abrasives had to be spread frequently in an effort to reduce the slipperiness of the packed snow and ice the plow blades were unable to remove. Now only a small quantity of cinders are applied once after the salt has been distributed.

All the principal streets in Easthampton's system of 67 miles are straight salted. The equivalent of about ¼ lb. per square yard of street surface is applied down a center strip of the road. Last year 52 tons of Grade CC salt were used for this pavement maintenance program.

Flood Control Projects for Postwar Construction

An authorization bill was introduced on March 27 in the U. S. House of Representatives for flood control projects estimated to cost \$810,000,000. The entire program involving levies, flood walls, dams and reservoirs is intended for postwar construction. One of the largest projects, calling for an expenditure of \$200,000,000, involves deepening the Mississippi River from 9 ft. to 12 ft. from Cairo to Baton Rouge in the interest of navigation and flood control. This is a 15-year project and includes a comprehensive plan of bank revetment and dredging. Another \$200,000,000 project provides for improvements of the Missouri River Basin.

In addition to the above a river and harbor authorization bill containing projects estimated to cost \$361,886,531 was passed March 22 by the House of Representatives and sent to the Senate. This project also is intended for post war construction. Two large dams are included in this bill—the Clarks Hill Reservoir on the Savannah River (\$28,000,000) and the Umatilla Dam in Oregon and Washington, (\$49,700,000).



Mixing 125 lb. of local gravel and a medium-grade bitumen with two motor graders. Three complete rounds are made with both graders; the incomplete mixture is then leveled, the second application of bitumen applied and mixing continued. This native gravel was well graded to make a satisfactorily dense mix

Preserving Old High-Type Flexible Pavements Awaiting Deferred Construction

Temporary maintenance, repairs and resurfacing methods as recommended in a sub-committee report, submitted at recent annual meeting of the Highway Research Board

WHEN the surface is only for temporary use, maintenance work should be done at the lowest possible cost to maintain the pavement in suitable condition for its traffic until the new pavement is built. Temporary patches, followed sometimes by surface treatments or light road mixes, will be called for.

Shoulders should be given enough attention to keep them safe for traffic. Suddenly increased traffic will sometimes require a temporary widening of traveled surface with local aggregates. The condition of the road and its importance for necessary traffic, together with the density, will determine which of the methods described below should be used.

A. Temporary Patches

For only temporary use of the pavement, digging out and replacing the base ordinarily will not be justified. *Building up rather than digging down to gain strength will cost less if any appreciable area of surface is involved.*

This principle is one to keep in mind even in making more permanent patches, too. However, holes through the pavement should be cleaned of dirt and other foreign material and filled with coarse aggregate, well

Chapter II of report. The first section, on patching high-type flexible pavements, was presented in March Roads and Streets. Chapter III on widening such pavements will appear in May. This report is subject to change before final publication by the Highway Research Board.

tamped and filled with screenings. This base may then be topped with a suitable bituminous patching mixture. If the hole does not extend through the base, it frequently will be cheaper to fill with layers of the bituminous patching mixture rather than use uncoated aggregate. If application of the bottom layers before the next or top layer is permitted, traffic will aid in compacting.

For top course in these temporary patches, most any available bituminous mixture may be used. Patches will be feather-edged without cutting out any of the old pavement, to keep cost down.

For these temporary patches it may be less costly to use a readily workable mixture.* While not as permanent as some other patching materials, such mixtures generally can be

*Such as Class B described in Method I, see page 66, March, 1944, ROADS AND STREETS.

secured at lower cost, are easily spread and compacted by tamping or rolling, and readily conform to a feather edge. However, where patching material of a better type is available, it may save money over a special mix for a small quantity.

Paint Patch Often O.K.

Frequently for temporary patching, heavy paint patches described in Method I will be the lowest cost shallow patches that can be made and will serve very satisfactorily for a year or more. Several layers may be applied if the depth of the depression requires.

After holes have been patched, if general pavement condition shows serious weakness or disintegration during its expected life, a surface treatment or thin road-mix will be the next step for its further salvaging.

B. Surface (Skin or Seal) Treatments

Surface treatments, sometimes called skin or seal will cover the patches and delay further disintegration of the old surface. Such a skin treatment may consist of an MC-5*

*Other grades that may be used are RC-3 and MC-4, the latter in place of MC-5 if cold weather prevails.

cutback asphalt or RT-9 tar, 0.2 to 0.3 gal. per sq. yd. with No. 7 ($\frac{1}{2}$ " to No. 4) size covering aggregate. This aggregate may be either of crushed stone, slag or gravel, 10 lb. per 0.1 gal. of bitumen. (Exact amount will vary with aggregates.)

All aggregate that will be held by the bitumen should be applied. However, no large excess should be applied as it will act as an abrasive under traffic and remove some of the aggregate that has adhered.

After the aggregate is applied, it should be lightly broom dragged and rolled. Broom dragging is intended only to uniformly spread the aggregate and should never be intense enough to disturb the aggregate stuck to the bitumen. On the heavy grades of bitumen such as MC-5 or RT-9, aggregate must be spread and rolled promptly after application of bitumen, particularly in cool weather.

If insufficient aggregate is indicated later under traffic, as much as will adhere should be added from time to time. Never should a surface be allowed to remain showing a "fat" condition (one over-rich in bitumen) as such surfaces may be the source of a slippery condition in later months. For a final cover to correct a slightly richer surface, a comparatively fine graded aggregate may be used. Crushed slag No. 10 (No. 4 to 0) is excellent, as it has high absorption and will readily dry up excess bitumen and produce a non-skid surface. However, a finely crushed stone, gravel or coarse sand also will be satisfactory for this "mopping up." If done during hot weather, there

will be less need for applying additional aggregate after completion.

Where Defects Are Slight

Where only a slight weakness of the surface prevails, a lower cost (but more temporary) surface treatment may be made with RC-2, MC-3 or RT-4, using No. 9 (No. 4 sieve to No. 16) aggregate or coarse sand covering, with 0.15 to 0.20 gal. bituminous material and 10 to 20 lb. aggregate per sq. yd. However, when softer grades of bitumen are used, all but slow-speed traffic should be kept off until the bitumen is sufficiently dry to prevent serious displacement of aggregates.

For Very Old Sheet Asphalt

A temporary method of reclaiming an old badly cracked sheet asphalt pavement consists of applying 0.25 gal. of 150-200 pen. asphalt (350° to 380° F.), covered with warm pre-coated concrete sand, 20 to 25 lb. sq. yd. Sand is heated to about 225° F. and coated in a pugmill with 1% (by weight) of MC-2. After spreading, the sand is broom-dragged, rolled once and opened to traffic.

Additional applications of pre-coated warm sand are made and dragged for three days under traffic. All sand that will be absorbed must be applied. The kneading action of pneumatic tire traffic is necessary. The use of pre-coated sand covering prevents dust during the operation and aids in its absorption in the asphalt, thus reducing the "whip-off" from traffic. This method so thoroughly fills the cracks that they do not open in the

surface as readily as on the ordinary surface treatment.

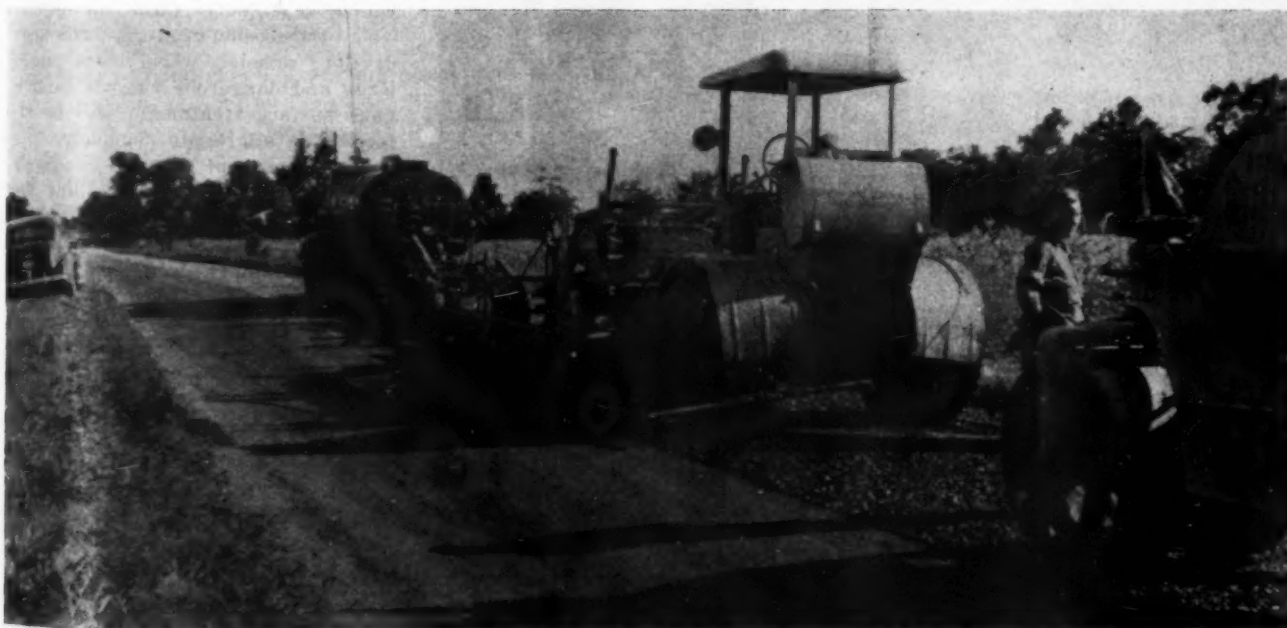
Before the surface treatment is applied, any shallow holes and wide cracks are filled with sheet-asphalt mix, tamped or rolled. This will stop the rocking of any loose pieces of the old pavement. Satisfactory only during warm weather.

C. Road Mix

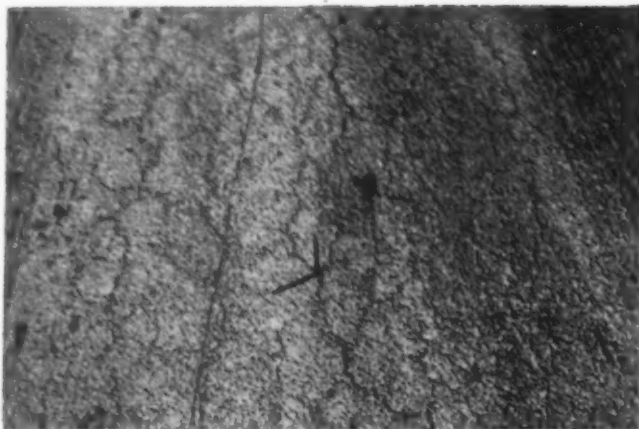
If there are reasons for smoothing and strengthening the old surface as well as thoroughly sealing all cracks, a thin road mix will accomplish this more satisfactorily than the skin or seal treatment.

Also, over-all weak base can be strengthened temporarily at reasonable cost by use of a road-mix type. For this work a tack coat of about 0.2 gal. of RC-3 (MC-3, MC-5 or RT-8 to RT-9) per sq. yd. is applied. Aggregate is immediately and uniformly spread upon this tack coat, additional bitumen applied in two or more applications and intimately mixed by machinery after each application. After the final mixing, mixture is spread to a level and uniform surface and rolled.

Most of the rolling should be done when the bitumen is at such proper stage of drying that aggregate will be compacted to maximum density. MC-3 is used with a dense graded aggregate containing 5 to 10% passing 200 mesh. The RC-3 must be used with an open graded aggregate containing not over 5% minus No. 8 screen, and will require a seal coat usually of 0.25 to 0.3 gal. and 15 to 25 lb. of No. 8 ($\frac{1}{8}$ " to No. 8) covering aggregate.



Making a road mix of open graded aggregate and a heavy bitumen by once over with the mixing machinery. Retread mixer is drawn by the distributor which is immediately followed by heavy motor grader with special blades which further mixes and levels the aggregate. The mix is rolled, after which seal coat and fine aggregate covering are applied and the surface is again rolled. This method is used to shorten the period of interfering with traffic



(Left) A close-up view of certain weak places on road to be given road mix patch. (Right) An 18 ft. pavement which has been widened with 3 ft. of treated aggregate to carry the traffic temporarily until the pavement proper can be widened

The maximum size of aggregate used in any mix should be no greater than the average thickness of the course to be constructed.

The general principles are to secure a uniform mixture of the bitumen and aggregate with least segregation, spread to a level surface, and compact thoroughly. The mix may be made in one lift, or two or more. Usually about 125 lb. of aggregate is maximum for one lift.

To Cut "Road Closed" Period

Where it is imperative to open the road quickly, a technique has been developed for using as heavy as MC-5 or RT-10 with a once-over operation of the mixing machinery. One-half of the road is surfaced at a time. Roll-

ing and seal application can be done the same day.

Where Mixing plants are available, it will sometimes be more practical to use a workable plant mix in place of the road mix. Class B, Class F or Class H [see *March Roads and Streets*] may be spread from a truck scraped into depressions and leveled with a motor grader, compacted by rolling when at proper curing stage. A plant mix may be spread over the entire surface following this patch work.

D. Shoulder Maintenance and Temporary Widening

Sometimes roads awaiting construction of a new pavement are required to carry a sudden increase of traffic,

and shoulder ruts paralleling the pavement must be given consideration. Such ruts which are caused by traffic or erosion, or both, can be filled with local aggregate, either bank gravel, crusher run stone or slag. With an occasional dragging, they may be kept in a safe condition. The aggregate should be well compacted. This may be done by regulated slow-speed truck traffic and systematic dragging, or by rolling.

In dry weather, sprinkling in conjunction with the compacting may be necessary. A standard 3-wheel roller or a trench roller may be used.

For temporary purposes bituminous material may not be justified, but the use of chlorides will assist in the maintenance by retaining moisture in the aggregate. However, for a season's or several years' use, it may be economical to use some bituminous mixture, particularly to fill bad ruts which repeatedly form on grades where the erosion of storm water soon develops a small wheel track into a large and dangerous rut. A bituminous surface treatment* will be effective on aggregate shoulders.

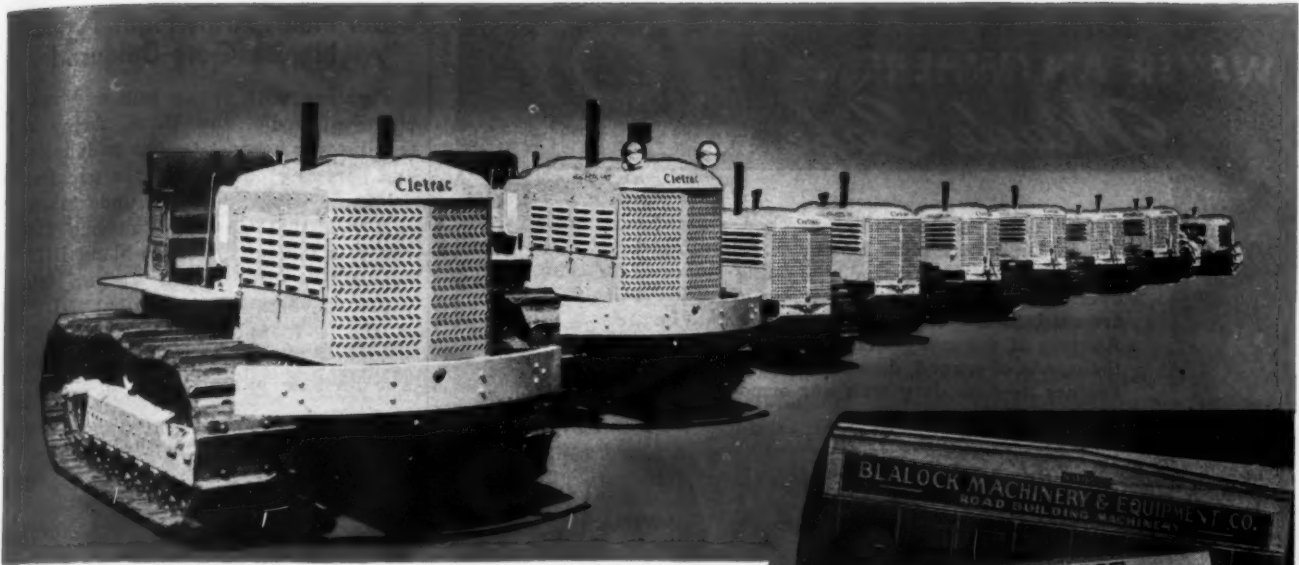
Such treatment may be effectively dragged at less cost, thus filling the rut with a road mix. In refilling the rut that may form, plant mix with good workability may be justified. Although a roller is desirable, particularly on the plant mix, the loose aggregate may be fairly well compacted by traffic.

*From 0.3 to 0.5 gal. of MC-3, SC-3 or RT-4 per sq. yd. would be for this purpose.

75% of All-American Highway Open—About three-fourths of 3,356 miles of the Inter-American Highway now is open for all-weather travel and work on several of the unfinished sections is underway. The route of this highway extends from the United States border at Nuevo Laredo, Mexico to the Panama Canal.



Constructing a temporary shoulder on an old 18-ft. pavement to provide safety for high-speed traffic until reconstruction. This work consists of excavating 5 or 6 in. down, then filling the trench with aggregate. The top course is a bituminous concrete. The old road, including widened portion, will be resurfaced with a layer of bituminous concrete to carry the traffic until a new pavement can be built



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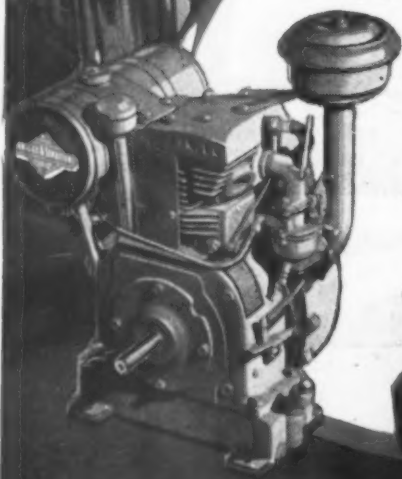
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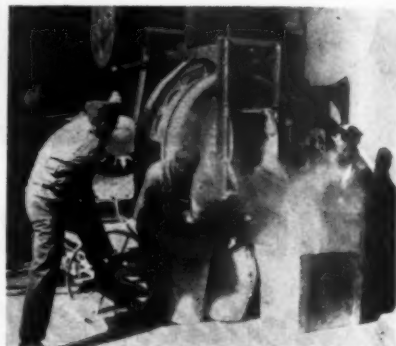
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Mixer Helps Army Fight Typhus As Naples Gets Deloused

Fighting with spray gun and vaccination needle, the U. S. Army is waging war against typhus in Naples, and carrying out one of the greatest delousing programs ever undertaken.

A half-ton capacity Ransome 148 concrete mixer is used to blend DDT delousing powder with Italian talc which prevents skin irritation. "DDT" is the code name for a lice-killing compound made in the United States. The formula is secret.



Mixer Blending Delousing Powder with Talc

This unusual and probably unprecedented application of Ransome concrete mixers developed when it was discovered that Neapolitans were prostrated by the contagious fever which is transmitted by body lice. The U. S. Army, aided by experts from the Rockefeller Foundation, immediately set up a typhus commission, consisting of five coordinated branches: The Case Finding Unit; the Contact Delousing Service which dusts unsanitary living conditions with a special lice-killing powder; the Mass Delousing Service with stations throughout the city; the Flying Squadron which investigates reported cases and "dusts" those who have been subject to the diseases, and the Immunization Service which handles vaccinations.

State Not to Maintain Access Roads

The State Highway Commission of Indiana has announced that it is not responsible for the maintenance of defense plant and military access roads which are not a part of the state highway system. Letters to this effect are to be sent to the officials of cities, towns and counties of the state where such projects have been constructed. The commission pointed out that while the State Highway Department constructed the roads and bridges, it was acting only as construction agent for the Federal government.

1944 Road Upkeep and Repairs — III

Concluding a summary of state highway department reports on arterial road conditions, maintenance programs and methods

Alabama Needs to Repair Timber Bridges

From Geo. W. Phillips, chief engineer, construction and maintenance, Alabama state highway department:

Accumulated highway maintenance needs are due, principally, to shortage of equipment and labor. Equipment requirements would be relieved considerably if we were able to secure repair parts as needed but we are also badly in need of replacement of units that are worn out.

Our main problem will be repair of timber bridges. We are able to secure materials for road maintenance as needed but no detailed bridge repair plans can be made because no definite information can be secured as to timber delivery. This has affected us to the extent that load limit has been placed on several bridges.

Painting of steel bridge structures has been carried on as the labor situation would allow but in general we are behind schedule.

About 15% of 1943 bituminous resurfacing was brought over to 1944. Also considerable bridge repair and painting, and 50% of surfacing of unpaved roads.

Some 2,000 miles of various types will need special maintenance in 1944—200 miles heavy repairs, 1,700 miles resurfacing and 100 miles entire reconstruction as a military necessity. By types, about 100 miles each of bituminous and 1,200 miles of bituminous paving and 500 miles of unpaved roads will require resurfacing.

In taking care of unpaved roads, the

method will be, of necessity, spot patching. On bituminous paving, the most common treatment will be liquid sealing blotted with slag or stone chips. On concrete surfaces, a penetration-type application with bituminous plant mix surfacing will be used.

Approximately 15% of maintenance surfacing will be let to contract. Our 1943 maintenance budget will be about \$3,000,000.

W. Va. Tightens Maintenance Belt

M. L. O'Neale, chief engineer, state road comm. of W. Va., reports:

Of maintenance work planned last year, considered as minimum needs, we were forced to carry over about \$250,000 worth due chiefly to shortage of equipment and suitable supervisory and operating men. We also carried over another \$250,000 classifiable as reconstruction.

In 1944 we will probably have some 2,000 miles of bituminous roads of various widths which will require light surface treatments and some 100 miles of heavy treatments.

We will rely chiefly on patching, spot sealing and light surface treatments and stress maintenance of proper drainage. Perhaps a third of our resurfacing work will be let to contract.

Normally we spend from seven to eight million dollars a year on maintenance, and I would say that we will face the necessity this year of reducing by 25 to 30%.

One of the most serious problems in preserving roads has been difficulty of keeping equipment in operation.

Much equipment is obsolete but not replaceable and it has been extremely difficult to secure repair parts and also skilled mechanics.

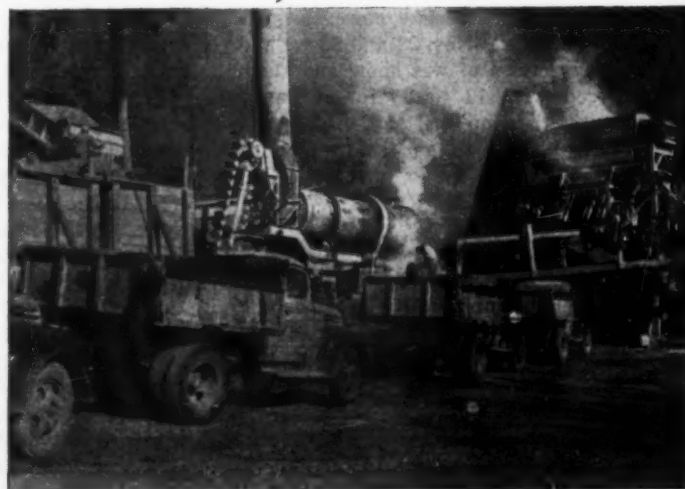
Many secondary roads have been abused and destroyed by haulage of coal and timber from new developments. The trucks are heavily loaded. Concentrations on roads and bridges not designed for such traffic have resulted in enormous damage and present a very serious problem to us unless we can secure Federal assistance. In some cases where the mine is off an existing road or on a very poorly developed road we have been able to secure federal funds under the category of "access roads to sources of raw materials." However, much work has to be done with state forces and equipment, further handicapping regular maintenance work.

Vermont Had Winter Worries

Reports H. E. Sargent, commissioner of highways and chief engineer, Vermont:

We are doing our best to keep present roads in good serviceable condition by maintenance. However, this is becoming more and more difficult as labor shortage becomes more acute and equipment older. We have more frequent break-downs of our equipment, and much difficulty in obtaining repair parts.

A great many miles of new construction would have been built in the past two or three years had conditions been normal. It has been necessary to give these sections special maintenance. Such roads consist most-



Asphalt plant and spreader placing 70-lb. plant-mix seal, 1943 Alabama state highway maintenance and repair program. 2,000 miles of Alabama arterials will need special maintenance in 1944



Spring road work is a serious chore in Northern Michigan, where severe winter and spring thaw require major reshaping of many miles of road

ly of surface-treated gravel, treated originally many years ago. Last summer it was necessary to resurface about 50 miles with stone and bituminous material.

Trucking has increased all over the State. Roads affected most are those in the vicinity of war plants. At least 50 miles more will require repair and resurfacing.

One of our special problems is winter care of roads. It has been our policy to have roads plowed promptly and sanded as soon as needed for winter travel. This year we have only two-thirds normal crew manpower for this work and seasonal extra labor has entirely disappeared. We use about 150 private trucks on winter maintenance. None of these private owners have been able to buy new trucks for two years, with the result that breakdowns are more frequent.

Our roads cannot be kept open as readily now if a storm is severe. Due to manpower shortage many trucks have to cover double the former mileage. Light storms, however, are easily handled. Nov. 22 and 23 we had a heavy storm of wet snow and slush covered with 12 to 36 in. of heavy snow with deep drifts. It took two to three days to get some sections opened.

N. J. Backlog of Shoulder and Resurface Work

Writes Alex. W. Muir, superintendent of maintenance, New Jersey state highway department:

The state highways of New Jersey have probably suffered less under war conditions than other state roads. Of 1,743 miles maintained, 1,620 miles are high type surfaces, better able to withstand heavy wartime traffic.

However, we have been forced to very seriously curtail shoulder work

and, lacking workers, have not kept up rights-of-way normally. Considerable bituminous treatment of shoulders was done in 1942 and 1943; now completely eliminated. In 1942 and 1943 consumption of bitumen was about 15% of normal.

We would normally have bituminous resurfaced some older concrete pavements in the last two years. Accumulated work of this type will require about 33,260 tons of plant-mixed materials. It is not contemplated that the whole of this work will be done in the year 1944, due to the labor shortage. It is hoped, however, that we can catch up on shoulder treatment, although the backlog of work is considerable. Our normal use of bituminous materials for resurfacing and shoulders was about 1,000,000 gal. annually. Our present backlog will require over 1,500,000 gal.

In terms of plant mixed resurfacing $1\frac{1}{4}$ in. thick this gallonage means about 532,000 sq. yd. It is not fair, in our opinion, to place responsibility for all this work on the wartime emergency, as many pavements involved have reached an age where such work would have been necessary or desirable without regard to the war emergency. During the past year we found it necessary to make some concrete replacements on a purely patchwork basis, however.

The N. J. highway department has never owned any distributors and has always contracted for liquid bitumens furnished, delivered and applied. It has, furthermore, with one exception a considerable number of years ago, always purchased hot bituminous mixtures delivered in place on the job. Cold plant-mixed materials have, however, for the most part, been purchased furnished and delivered, with laying done by department forces.

Our greatest problem is shortage of manpower for normal maintenance, snow removal and ice control. Snow removal has also been handicapped by use of very old equipment which has outlived its usefulness. We have also had difficulty because in many cases contractors who have sought this type of work are either busy with war work or are themselves short handed.

Kentucky Roads Need All Types of Maintenance

T. H. Cutler, state highway engineer of Kentucky, writes:

Accumulated maintenance and repair need on the Kentucky Highway system is increasing on main roads. Heavy repairs may be made on a considerable mileage of concrete this year; total mileage has not yet been determined. Resurfacing should be about the same as last year, or about 550 miles.

Heavy repairs to concrete pavement will consist principally in replacing failures with new concrete of proper design.

Some mudjacking will also be done, to bring low areas back to grade.

Considerable spot patching will be done on bituminous surfaces where failures occur.

Resurfacing of existing bituminous surfaces will consist principally of $\frac{3}{4}$ in. of plantmix, or mixed-in-place treatment. About 375 miles of bituminous resurfacing work, and a small mileage of concrete patching, was done by maintenance contract last year; should be about the same for 1944, which will cost about \$6,000,000.

A special problem confronts the Department in the maintenance of concrete pavements susceptible to mud pumping.

Minnesota Roads Get Off Easy

From O. L. Kipp, chief engineer, Minnesota department of highways:

Minnesota, being more or less on the edge of heavy industrial war activity and completely out of the area where there are any military maneuvers or war camps, is being spared from the heavy damages that are reported in some other states. While we do have some heavy trucking, it is not extensive or particularly damaging up to the present.

At present we are not planning on any unusual maintenance programs designed to take care of special traffic problems arising out of war conditions. We expect a nominal upkeep program, due to substantial dropping off in traffic on trunk highways. No maintenance work was held over from 1943.

On concrete pavements we will continue the usual amount of mudjacking, about 50,000 sq. yd. annually. Also some spot patching with concrete and some with bituminous materials, in one or two instances we may cover short sections of concrete with bituminous road-mix. Bituminous roads will get normal patching, retreatments and seal coating.

Contract Maintenance

It has been our policy to do our special maintenance work by contract insofar as possible. The items usually performed by contract are: Producing and delivering mineral aggregates; hauling and applying bituminous materials; occasionally small grading jobs by contract under Maintenance. In all our bituminous maintenance work, the state purchases and furnishes the bituminous material, f.o.b. nearest railroad station.

Our tentative 1944 Maintenance budget comprises the following items, somewhat below pre-war figures:

Routine maintenance (roadway, shoulders, roadsides, traffic service devices, snow and ice control, structures)	\$3,715,000
Special maintenance (dust control applications, regaveling, bituminous surface treatments, mudjacking)	1,220,000
Betterments (substantial additions to original road structure, replacement or repair) ..	175,000
Emergency maintenance	65,000
Total	\$5,175,000

Special problem: truck axle weights are gradually becoming heavier, heavy axles more numerous. Where this heavy trucking is of any considerable amount, our roads very soon start showing distress. So far, we have been able to keep the situation fairly well under control. Our legal limit has been 9-tons gross for some years, but it is apparent that our roads did not suffer much from this provision because few trucks operated with 9-ton axle loads.

One of the big problems that will have to be solved following the war, is this heavy hauling. Trucks are important to the national economy, but at the same time some limit will have to be placed on the loads that can be hauled and some requirements will have to be made in regard to their ability to move over the highways. At the present time a heavily laden truck can block traffic almost constantly while attempting to negotiate adverse grades. The 4-lane road would, of course, be the answer to this problem, but by far the greater per cent of the highways can never possibly be built with 4-lane roads. Truck-axle weights and truck obstruction of highway traffic movements are two post-war problems that will need careful and thorough consideration.

Report From Oregon

States R. H. Baldock, Oregon state highway engineer:

Log trucks and other heavy loads have caused cracks, breaks, and distortions in the surface, which have been repaired as a first order of maintenance, but the resurfacing of many miles will be required in the postwar period. Considerable reconstruction has been deferred.

Some of the lighter-type surfaces suitable for prewar traffic have suffered extraordinary damage under concentrated construction traffic near cantonments and airbases and in maneuver areas, but the Army has used its best efforts to keep damage in maneuver areas down to a minimum.

Cost of maintenance in 1943 was \$4,913,000. Maintenance budget for 1944, including rock production, is planned at \$6,000,000. Section crews will perform penetration patching, along with other work. And extra gang crews will re-oil 680 miles of oiled macadam and, with portable plants, place about 88,000 tons of asphaltic concrete in repair work.

The State contracts the production of broken stone and crushed gravel, but performs nearly all other maintenance with its own crews. We probably will contract the painting of one large steel bridge and the re-oiling of two sections of highway.

\$2,000,000 Flood Damage to Georgia Roads and Bridges

A succession of spring rains, resulting in all-time-high river crests in some part of the state, caused widespread damage to Georgia highways in recent weeks. While the preliminary estimate of loss is \$2,000,000, the figure may turn out to be higher, according to State Highway Director Ryburn G. Clay. Every division highway had all available maintenance personnel out in an effort to restore traffic and prevent traffic accidents, with county road organizations aiding in some areas.

Embankments and bridges along the Coastal highway were protected with sand bags. U. S. 41, main north-south arterial into Florida, was among the routes closed for a period by washouts. A dozen bridges were taken out, including a 100-ft. span and approaches on State Route 83 near Forsyth, where four persons were drowned in a car which went into the break.

This turn of events, Mr. Clay pointed out, is particularly serious in Georgia because of wartime reduction in highway revenues which has made it difficult to keep up with mounting maintenance and repair needs.

State Obligations for Highways

The aggregate state bonded debt for highways was \$1,737,057,000 on Dec. 31, 1942, according to a recent publication of the Public Roads Administration. Of this amount \$1,723,642,000 was for roads and bridges on the state systems, and the remainder, \$13,415,000, was for construction on county and local highways. Reserves for principal totaling \$199,713,000 when offset against the gross debt, reduce the net debt to \$1,537,344,000. Since the grand total of retirement reserves was practically unchanged during 1942, the reduction in both gross and net debt was slightly in excess of \$100,000,000.

Few new bonds were issued during 1942, the major portion of the additions to the lists being accounted for by assumption of reimbursement obligations (for construction by local governments on roads now under state control) and by refunding issues.

It Costs More to Drive a Car Nowadays

Reduction in car mileage because of gas rationing has brought about a substantial increase in the per mile cost of driving. The American Automobile Association has been making a study of the situation. Some of the findings as set forth in an AAMVA bulletin follow:

In the eastern gasoline shortage area the cost of car operation for the average motorist has risen from about 6 ct. per mile in the pre-war era to more than 12 ct. at the present time; the cost per mile of driving for "A" card holders has risen to 34 cents.

In the central states, that is mid-western and southwestern states, the per mile cost of car operation for the average motorist has risen from about 6 ct. to 8 ct., while the present per mile cost for "A" card holders is slightly in excess of 17 ct.

A similar increase has taken place in per mile cost of car operation on the West Coast. The pre-war cost of 6½ ct. per mile has risen to almost 9 ct. for the average motorist, and 15 ct. for "A" card holders.

The national average per mile cost of car operation in 1939 was 5.9 ct. Mileage rationing controls have brought this figure up to 9.8 ct. per mile. Considering the extent of automobile registrations in each of the states under review, the average per mile cost of car operation for "A" card holders is 22.6 ct.

Planning Small Drainage Structures With Eye for Lower Maintenance

BUILDING maintenance into highways involves building into highways at the time of construction certain inherent durable qualities which will later eliminate the necessity for maintenance; and as most of the state highway departments are now making surveys and preparing plans for sizable post-war programs of highway construction and reconstruction this is, it seems to me, a very propitious time to analyze the errors of omission and commission perpetrated during the past years, and as we plan this new work to give particular attention to preventive maintenance measures.

I am convinced we have too long considered construction and maintenance as two separate operations to be planned and executed under separate standards of thinking, operation and accomplishment, whereas the two are so inexorably tied together that they should be considered as one problem.

Designs and plans for all proposed new construction should be predicated upon their effect on future maintenance, in order that as the actual construction progresses maintenance will be built into the highway.

Following is a discussion of this point of view as applied to one of the principal sources of maintenance expense, i.e., small drainage structures.

Small Bridges, Box Culverts

For small bridges and box culverts use simple designs with as few frills as possible, avoiding thin concrete sections and sections which are likely to crack or break off. This warning applies in particular to the tops of wing-walls and bridge-scats. For example, there should be no coping on a bridge-scat because to begin with it is for looks only, having no utility value, and in the end the coping usually breaks off marring both looks and utility.

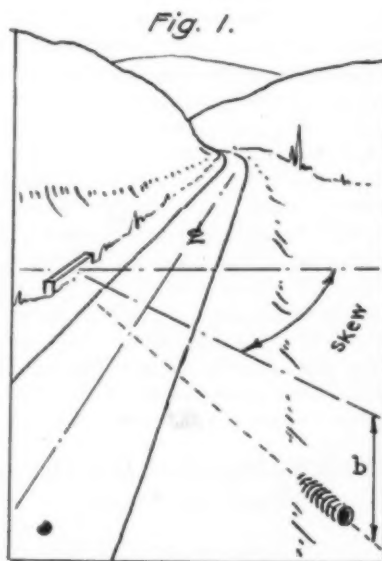
The design of footers for small bridges and culverts should provide for scour walls if a scourable foundation material is anticipated, and in many instances it will be found more expedient to pave the entire flow line and in addition place a scour wall at both the intake and outlet ends. Short wing-walls should also be avoided. Another error is lack of adequate waterway. If the opening is too large there is no damage, but if it is

By E. L. WORTHINGTON

State Maintenance Engineer
The State Road Commission of
West Virginia

Including timely suggestions first presented by the author at the recent meeting of the Southeastern States Highway Officials at Roanoke, Va.

too small, damage far in excess of a small additional initial cost will result.



Ditch Relief Pipe Culverts to be placed askew instead of at right angles to CL, and also to be placed on as steep a grade as is practicable. (b)

Pipe Culvert Design.

Pipe culverts should be designed to suit the type of soil upon which they are placed. For example, pipe in short joints may be used if the foundation bearing is uniform throughout the entire length of the string of pipe, but if there is lack of uniform bearing, then either uniform bearing must be provided or else the pipe must be incased to prevent the pipe breaking in two or pulling apart thereby permitting water to seep into the fill causing movement and slides. The use of corrugated metal pipe in long sections will eliminate the non-uniform foundation problem in some instances.

The length of the pipe culvert is very important. It is better for a pipe to be too long than too short.

The position of the pipe with reference to the centerline of the road and the flow direction of the stream is of utmost importance. The direction of the pipe must always line up with the stream in order to insure uninterrupted flow of water. On steep grades all pipe installed for ditch relief should be placed askew at about a 45° angle with road centerline, so the flow of the ditch water will be expedited and while being expedited will make the pipe self-cleaning. The grade of the pipe should also be as steep as is practicable.

It has erroneously been common practice to place such pipe at right angles to the centerline and with very little fall in the grade of the pipe in order to use less pipe, and as such installations invariably result in the pipe becoming filled up after every heavy storm an expensive maintenance operation results; furthermore, when one pipe stops up the amount of ditch water for the next pipe is increased thereby filling it more quickly than would otherwise be the case. Soon all ditch relief is eliminated and the rush of the large amount of water does serious damage to the ditches, slopes, shoulders and in many instances the pavement itself.

Intake and Outlet Worth Careful Detailing

The design of the structures at the intake and outlet ends of pipe and box culverts is also very important. When the water which enters the culvert comes down over the cut slope, a paved spillway or flume should be



Fig. 2

"U" Type of Headwall to protect both roadway and slope and turn water into pipe.

provided to prevent erosion. When all the water which enters the culvert comes down the ditch from one side a "U" type of headwall should be provided—one side of the "U" to hold the shoulder, the other side to hold the slope and the bottom of the "U" to stop and turn the water into the opening. The common method has been to use an "L" type of headwall which does not provide protection for the slope side. This permits the slope side to erode resulting in the sloughing of the slope and providing more material to fill up the culvert.

When the water which enters the culvert comes in from both sides the practice has been to provide only one headwall to protect the end of the culvert, whereas there should almost always be another headwall parallel to and a couple of feet away from the other to hold the slope and thus prevent erosion.

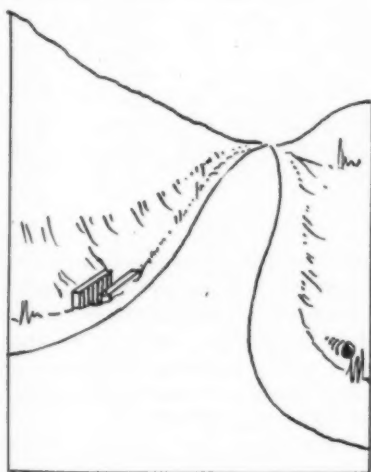


Fig. 3
Parallel Headwalls to protect both roadway and slope when water enters from both directions

In instances in which the water comes into the opening from either one or both sides and a high cliff of erodable material is on the hillside of the culvert a type of covered inlet should be provided in order that the rocks and dirt which roll down the slope will not obstruct the actual opening of the culvert.

The outlet end of a culvert is also very important and paved spillways or flumes should always be provided when the discharge from a culvert must be carried to a lower level through an erodable material.

Construction Details

There has been a tendency to use too few pipe culverts with the result that the quick disposal of surface water has been retarded. Whenever water has to be carried a long dis-

Covered Inlet to keep falling rocks and dirt from blocking opening.



Fig. 4

tance to a pipe a certain amount of the water soaks into the adjacent soil storing up future potential damage.

The final location of pipe and box culverts is usually determined by the field engineer or inspectors but as the location is such an important detail very close supervision should be exercised, because the direction and elevation of such structures is of the utmost importance in its effect on future maintenance. Every single installation is a problem of its own and should be given most careful consideration, with special thought to its continuing to function properly.

Innumerable box culverts and small bridges now have their effective waterway materially reduced, be-

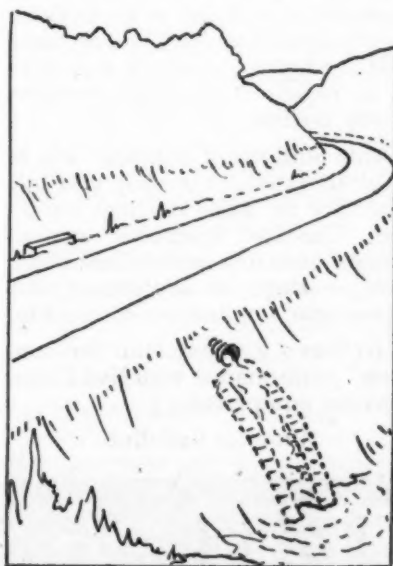
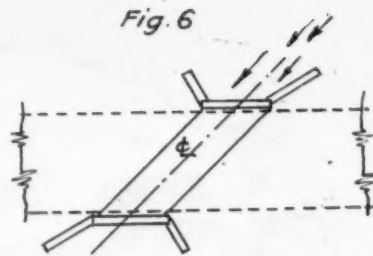


Fig. 5
Paved spillway or flume.

Fig. 6



Place of Culvert parallel to direction of flow of stream.

cause care was not exercised in placing the flow-line of the structures at the proper elevation with reference to the average old ground at the intake or outlet ends.

Little details pertaining to the expansion joints on small bridges are

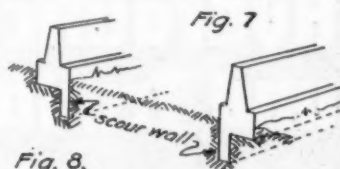


Fig. 8

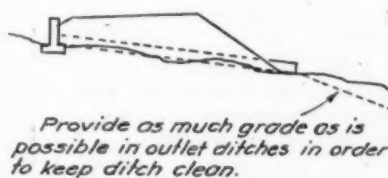


Pave Flow Line to prevent Scour.

often overlooked, and result in cracking and spalling which mar the looks of the structure and effect its utility.

Another detail often overlooked is the lack of uniform bearing under the entire length of a box culvert or small bridge abutment. Such uniform bearing or support must be provided otherwise damaging differential settlement will result.

Fig. 9



Whenever possible the flow-line of a pipe culvert, box culvert or small bridge should be held on the same line and grade, because a change in either horizontal or vertical alignment will change the velocity of the water thus causing it to deposit its load of sediment.

Fig. 10



Flow Line of Structure to conform with average old grade elevation at both inlet and outlet ends.



Hydraulic Bulldozers and Trailbuilders



You get bonus loads with Heil dependable 4-wheel Scrapers . . .

Heil design gives you all-welded construction, fulcrum-type lift, ample tire clearance, more efficient performance under widely varying field conditions—feature after feature that will help establish your reputation as a successful operator. •

Enjoy the benefits of easier maintenance, longer life, and simpler field repairs when working far from a supply base.

Write for bulletins giving details of Heil's advanced design.

**SEE YOUR
CLETRAC TRACTOR
DISTRIBUTOR**

**.. for bigger loads
and more yardage
.. per day.. per year**

The advanced design of Heil Bulldozers and Trailbuilders assures you of more speed, greater flexibility, and ability to take the tough jobs without wavering.

Heil's experienced fabricators have replaced many of the heavier members with welded box sections that are lighter, stronger, and easier to repair in the field without costly delays.

This equipment is tailor-made to Cletrac Tractors, giving you full visibility for safe, efficient handling. The Heil hydraulic system comes close to a perfect leak-proof unit — stays in adjustment and gives you a minimum of trouble.

Achieve a reputation for "on-time" performance with Heil Earth-moving equipment.

Write for bulletins.

R-26



THE HEIL CO.
GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

Post-War Road Hearings (Continued from page 64)

It would not be possible even to approach the minimum requirements without substantial financial assistance to the several States and their political subdivisions from the Federal Government, Mr. Upham stated. On this premise, he made the following recommendations:

"States and political subdivisions," he said, "should bear 50% of the cost if able. However, for the first two years, 75% federal share probably will be necessary. A minimum federal fund of \$500,000,000 annually for F.A. roads, \$250,000,000 for secondary, \$250,000,000 for cities, 10% of the funds to be available at once for plans, surveys and r. of w."

March 23. Guy Kelcey, highway analyst for the Port of New York Authority, suggested that if aid is left at \$1,000,000,000 a year, \$500,000,000 should be allocated to urban projects. Wilbur LaRoe, Jr., associate counsel of the Authority, stressed the intensive utilization of urban routes by cars and trucks from every section of the country (1500 a day through Holland Tunnel from states west of New Jersey).

Additional ARBA representatives supported recommendations submitted March 22 by Charles M. Upham for expenditure of \$3,000,000,000 a year minimum for five years. Otto Hess, Kent County, Mich., who heads the Association's county officials division, recommended \$250,000,000 a year for secondary and feeder roads. Raleigh W. Gamble, president ARBA municipal division and Milwaukee's superintendent of street construction, proposed \$250,000,000 a year for urban improvements, apportioned on population basis. Ralph Willard, Frederick County, Md., spoke for a definite rural allocation.

March 24. The American Automobile Assn., through Wm. A. Stinchcomb of Cleveland, recommended that 60% of post-war F. A. go to the Interregional System "with due emphasis on its urban parts," to be proportioned among the states 80% on basis of gas consumption, 20% on interregional mileage.

Safety Through Construction

Sidney J. Williams of the National Safety Council, submitted accident statistics, said the surest and most economical way to stop these accidents is to "build safety into the highways." He recommended the design standards of the Interregional Highway report and termed the report the "greatest single contribution ever made to highway safety."

Charles H. Sells, New York State director of P. W., opposed H.R. 2426, saying that the distribution formula "is not in any way compatible with needs of the various States, nor does it equitably meet expected needs for unemployment relief. He proposed \$1,000,000,000 for expenditure in one year after the war, \$400,000,000 to be for a national highway system outside cities on a formula of $\frac{1}{2}$ on mileage and $\frac{1}{2}$ on estimated military and demobilization factors; \$600,000,000 on the national highway system inside cities on basis of motor registrations; \$200,000,000 for design and rights of way.

March 27. Mayor Edward J. Jeffries, Jr., of Detroit, told that Detroit faces a critical transportation problem, true also of many other cities. "Rural" needs have largely been met." It is time to join forces "in opening our congested cities for the free movement of vehicular traffic." With the lifting of wartime restrictions, traffic in Detroit will rise 25 $\frac{1}{2}$ above our all-time peak. Detroit contemplates an express highway network in the Metropolitan area including 168 miles of limited-access highways, with four highways totaling 47 miles to cost \$148,000,000 given first priority.

March 28. City Engineer Lloyd Aldrich, of Los Angeles, also reminded that metropolitan areas present the chief traffic problem, and limited access highways are the only satisfactory means of moving traffic into and out of the cities. He approved H.R. 2426.

Opposition to H.R. 2426 was presented by Lawrence Curtis of Boston, member of Massachusetts Commission on Interstate Cooperation. The Commission opposed what it submits is an undue expansion of Federal aid for highways, saying: "It is one thing for the taxpayers of a State to be taxed for roads in which there is a clear national interest. It is quite another thing for them to be taxed to subsidize local road construction in other States."

\$290,000,000 Appropriation Authorized

President Roosevelt on April 4 signed the bill authorizing Federal appropriations up to \$290,000,000 for defense highway projects, such as access roads to military and naval establishments. The act provides that \$5,000,000 be earmarked to care for damages to highways as a result of military maneuvers.



The Heil Cable Dozer "digs in" for a big bite—to move a lot of dirt faster, more economically.

A simple adjustment changes over from extreme height for throwing to unlimited "down" thrust for deep penetration.

Blade raised to extreme height for "throwing."



HEIL

Cable Dozers

... easily adjusted for an extra deep bite ... to move more dirt — faster

The Heil Cable Dozer digs at maximum depth, whether in soft dirt or in hard-packed clay — because Heil engineers have designed this rugged unit to penetrate into the ground up to the tractor's ability to push dirt. Simply place the side arms in the upper hole in the frame, and you can achieve super-penetration.

Heil Cable Dozers are engineered to work with International Harvester TracTractors as a perfectly balanced team. The

simplified mounting avoids obstructing operator's view—gives him full vision ahead. Here is a machine that performs smoothly . . . gives fast, positive action under the toughest conditions, with minimum maintenance.

Trailbuilder blade and "A" frame are interchangeable with the Bulldozer blade and frame.

Write for Bulletins.

R-25

SEE YOUR INTERNATIONAL TRACTOR DEALER



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Louisville's "Spark Plug" Planning Group

Louisville's waterfront, showing Second Street leading from the Municipal bridge, widening of which has been listed as the city's most urgent future project

An unusual civic expediting organization and how it is functioning in cooperation with city, county and state officials to do a better job of future planning than any governmental or private agency could do alone

THIS article is about a city whose leaders want it to come out of the war a better place to live and work, instead of merely a community of collapsed war industries and the same old traffic congestion—and are doing something special about it now.

Louisville's Area Development Association hasn't yet resulted in a fully developed advance planning program, complete with survey parties and designers. That's a later chapter for which it will be ready when engineers are again plentiful. This group has only been in existence since November 8, 1943. But its outlines and methods and purposes are already attracting nation-wide interest.

What brought about the formation of this much-heralded association? What are its aims? Whom does it represent? How is it organized? Have any specific working principles

[Municipal planning, post-war or post-anytime, is more than a slide rule job. It must be based on community need, which is a partly intangible thing calculated on human hopes and business ambitions as well as on such physical data as traffic counts, population curves, etc. Truly sound future planning requires that engineers with vision sit down with business, industry, labor and social leaders and list practical neighborhood needs in first-things-first order. Louisville is doing this job on a non-partisan basis.—Editors.]

been evolved? Definite problems isolated? Post-war projects crystallized?

In particular, where does it fit in with the bodies which in Louisville, as elsewhere, have traditionally carried out the engineering of public improvements, i.e., the city department of public works, county road commission and state highway department?

How the Association Began

The Louisville Area Development is a "spark plug" group of civic, business and government leaders who set out to find a common meeting ground for working out the sort of community they want in the future. The Association was organized last fall with this general idea in mind, as a non-profit corporation under city sponsorship. Its formally declared purpose is "to determine upon and undertake to have carried into execution all the various local plans conducive to making the Louisville area, both within and without the corporate limits, a more prosperous and progressive community."

Its intent is to do something now; translate practical post-war projects into immediate action. The aim is to do more than help make jobs but to help Louisville hold its war-created

...Out of Reach. Out of Luck...



GOOD roads are as beneficial to the farmer in a business sense as they are to the motorist in a pleasure sense. Almost any rural community that will plan ahead can have the right Tarvia roads as investments.

TIMES HAVE CHANGED BUT NOT THE STORY

In 1930, Barrett published this advertisement championing the cause of the farmer. Yet, despite fourteen years of unprecedented road-building activity, Pearl Harbor found this country with 1,474,445 miles of roads still unsurfaced. This means that in the present crucial war period thousands of people are being denied quick and easy access to major traffic routes.

Actually, all over the country, the plight of the farmer "out of reach and out of luck" is more difficult than ever before. Today, under the stress of accelerated use and unavoidable wartime neglect, even the surfaced "feeder" roads are wearing out and

breaking down.

In fact, the problem of secondary roads is one which far-seeing highway officials realize must be dealt with *first* in post-war planning.

Barrett Tarvia is a prime factor in these plans. This famous basic road-building and maintenance material has already proved its practical value to tax-conscious communities in making possible economical construction by local labor—using local materials. The Tarvia field man will gladly give you full details, help you with the development of your post-war program.

THE BARRETT DIVISION ALLIED CHEMICAL & DYE CORPORATION

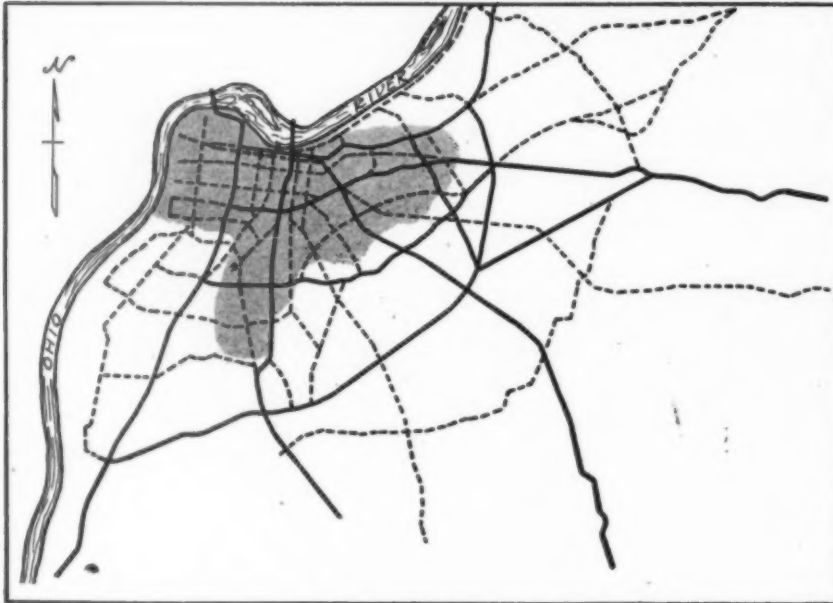
40 RECTOR STREET, NEW YORK 6, N. Y.

New York . . . Chicago . . . Birmingham . . . St. Louis . . . Detroit . . . Philadelphia . . . Boston
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Syracuse . . . Buffalo . . . Cincinnati . . . Bethlehem . . . Portland, Me. . . Bangor, Me.
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ROADS AND STREETS, April, 1944



Louisville and Environs
SOLID LINES show proposed arterial streets and highways in Louisville's area development program. These routes represent only a limited percentage of the present arterial grid-iron.
BROKEN LINES show major connecting streets

industries, safeguard the city's growth, bring about better streets, parks, housing and transportation facilities.

However, the Association's leaders do not like the term "post-war", and there are those among them who would be content with a return to the 1941 vicinity-population of 360,000 (today grown to 515,000). The chief concern is what to do with the 50,000 new war workers attracted to 200 local plants.

The Association is frankly pro-business. It began life with a two-year working fund of \$100,000, consisting largely of voluntary subscriptions from local newspapers, banks, utilities, labor groups, radio stations, etc. The City of Louisville and Jefferson County contributed \$20,000 of this sum from public funds to be expended, separate from private funds, through the affiliated City and County Planning and Zoning Commission on projects on which the two organizations agree.

Brain child of Louisville's dynamic mayor Wilson W. Wyatt*, the group is strictly non-partisan and non-political. Its ten incorporators, representing subscribers in their various groups, eventually will be expanded to a Board of twenty citizens, these incorporators include—Wilson W. Wyatt, Mayor of Louisville; Mark Beauchamp, Jefferson County Judge; George Buechel, Chairman, Louisville and Jefferson County Planning and Zoning Commission and President, Retail Merchants Assn.; Mene-

fee Wirgman, President, Louisville Clearing House Assn., Citizens-Union National Bank, Fidelity & Columbia Trust Co.; Mark Ethridge, Publisher, Courier-Journal and The Louisville Times; T. B. Wilson, President, Louisville Gas & Electric Co.; Edward H. Weyler, Secretary, Kentucky Federation of Labor; Mrs. George W. Norton, Jr., Wave, Inc.; Warwick Anderson, Member, Planning and Zoning Com., Doe-Anderson Advertising Agency; John G. Heyburn, Peter Heyburn & Marshall.

Mayor Wyatt began as its temporary president and K. P. Vinsel, a man of outstanding executive ability, familiarity with Louisville government and a background of municipal work, was selected as its full-time secretary and executive director.

Working Committees That Work

As with any effort of this kind, what finally gets done depends on carefully selected committees, headed by real workers. The Louisville Association to date has the following fully organized committees: Economic Development, Finance and Taxation, Streets and Highways, Housing, Health, Parks and Recreation, Survey and Research, Smoke Abatement, Transportation, Welfare, Sewers and Drainage, and Public Buildings.

Committees are also being formed as rapidly as possible for Education, Utilities and other phases. A Publicity Advisory Committee also is to be organized, as is a Public Participation group made up of liaison men from various civic clubs, etc., who will represent special views and interests

of their organizations and in turn interpret the workings of the Association back in their own groups.

Some committees will consist of already existing organizations, to avoid duplication. For example, there is a tie-up with the City and County Planning and Zoning Commission, which was formed early in 1943 through state enabling legislation. Some of this Commission's early recommendations were dusted off and expanded in outlining the new Association. The Commission is expected to take over the Association's planning and zoning committee functions.

Meanwhile also, Louisville's local unit of the National Committee on Economic Development, under Robert Montgomery, a local utility executive, has been incorporated in the Association as one of its separate divisions.

Streets Committee Highly Organized

Each general committee, which meets once every six weeks or so, works in turn through the recommendations of numerous sub-committees, meeting about every 2 weeks.

One of the most important is the Committee on Streets and Highways. It is headed up not by an engineer but by an industrial executive, Pierre McBride (vice pres., Porcelain Metals Corp.), who was chosen for his ability to organize, inspire, sift issues, get things done. Members include a county judge (ex-officio); also—and this is significant—Carl Berg, engineer for the City and County Planning and Zoning Commission; and Roy W. Burks, Louisville's director of works. Also ex-officio members are A. H. Zellender, County Engineer, and J. A. Reed, District Engineer of the State Highway Department.

This committee is today getting down to brass tacks through five sub-committees:

Sub-committee on Major Street and Highway Plan. Its scope of functions is "to advise on revision and extension of the major street and federal highway." Nine sub-committeemen include a farmer, an auto-club representative, an architect, a trucker, a real estate man, two from business and manufacturing. Also a man well-known in contracting, (A. A. Fisher of Bickel Construction Co.), and a surveyor-engineer, (Ben Ford).

Bridge, Viaducts and Grade Crossings. This committee consists of three business men, a labor leader, a contractor (George Eady, of Geo. Eady Const. Co.), the former president of the Louisville Board of Works (Edw. J. Miller), and a rail-

(Continued on page 86)

*See "The Mayor Gets Things Done," Readers Digest, Feb. 1944.



*"You should have seen
those little rats run!"*

On fighting fronts all over the world, word has come back of bulldozers in action, not only doing the vital jobs for which they are built, but *fighting* jobs as well. Among the most spectacular of these reports is the following contained in a letter from one of Buckeye's men in service:

"Now here is something I would like to tell you, now that I am back out of New Guinea. We had two pillboxes that were impossible for us to take, so they had a bulldozer about four miles away. We brought it up and by raising the blade charged the boxes. You should have seen those little rats run. We are still laughing. Now let me tell you something—it was a Buckeye blade and a Buckeye winch on the back! Keep up the good work and keep the Japs on the move."

After the war you can count on Cable Controlled Buckeyes to keep costs on the run. They've been proved in action — stripped down to fighting trim and built to take a beating. You'll be buying new equipment when it's available again. Keep your eye on Buckeye!

BUCKEYE TRACTION DITCHER CO.
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**WITH
BUCKEYE
CABLE CONTROL,
YOUR TRACTORS
CAN DO MORE
JOBS!**



Trenchers
Tractor Equipment
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Convertible Shovels
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ROADS AND STREETS, April, 1944

THE POSTWAR HIGHWAY BILL

(An Editorial)

AS we go to press, final hearings are about to be resumed on various postwar road bills before Congress. Thousands of road builders are asking two questions right now: What will the bill finally look like after everyone has had his say? And when will the legislation be enacted?

Mr. Hadden and others have reminded us that any legislation of such importance as this, of necessity, must be a compromise. County engineers in the Southwest and the city planner in the Metropolis have interests that are poles apart.

The wonder isn't that there has been much criticism and diversity of opinion on HR-2426 and other pending bills, but that there has been so little. Whether the Federal Aid formula turns out to be 50-50, 75-25, or something between, of course, will be mighty important to all parties concerned. But as we see it, there are just two things to worry about right now: The appropriation must be big enough to

do the job, and the necessary legislation must be enacted promptly.

It is an old American custom to aim the sights high when a big challenging opportunity comes along. This is certainly one of those times, and Mr. Upham's warning that a billion a year Federal Aid isn't enough should be taken seriously.

One witness warned that delay in enactment is a more serious matter than any detail of the law. Thousands of planning projects are held up at various stages until the terms of Federal Aid are cleared up. Just to mention one example: The State of Georgia is planning a new 4-lane limited access development of coastal highway U. S. 17, one of the three Inter-regional System roads which that state would have. Three survey parties are out right now, but they can only go so far because the design standards and allowable cost per mile, hinge on Federal decisions. So the transit crew will merely make center line locations as a base for later topographical strip surveys and development of location plans when it is known what the right of way width is to be.

(Continued from page 84)

road representative (Chas. Blackman, chief engineer, L. & N. R. R.).

Street Rebuilding and Repairing. Also takes in questions of street widening, elimination of dead-end streets and highways by extensions, and includes county roads. Comprises an engineer, a farmer and four business men.

Roadside Development Covers also control problems, street and highway lighting, and sidewalks. Committeemen include a landscaper, a nurseryman and a lighting expert from the local utility.

Parking and related traffic control problems (but not traffic itself, which comes under the Transportation Committee). A small group, also with engineer representation.

How Committees Work

Typical of the Association's policy, this elaborate committee set-up works with, not against, public officials. There have been no serious disagreements. Whenever any citizen advances a suggestion for a project, the proper sub-group gets all possible facts on that project's need, cost, usefulness, etc. Then asks "How does it fit in with an over-all plan?"

The sub-committees check with each other and with other committees through the parent committee. For example, a grade elimination is proposed on a given street. How does it affect the widening problem here? Ask the Street Rebuilding and Repairing Sub-Committee. Affect broader questions? See the Planning and Zoning Commission. And so on . . . Would the expenditures

be out of line with an over-all plan? Ask the Finance and Taxation group.

Every project is thus cross-reviewed as to its practical worth and feasibility. How many of the proposed jobs can be financed, and when and how, is in the Finance and Taxation Committee's lap.

Notable fact about the still young Streets and Highways Committee is the enthusiasm of its workers. Here is a group of citizens who have found it intensely interesting to work on such a committee. As a case in point, when a grade separation is proposed the committeemen actually go over the site, talk to local property owners, make common-sense decisions on such questions as, which of the two streets is of major importance? Should an entire section of one line be elevated? Etc.

Already out of this shirt-sleeves effort to put certain projects in blueprint form soon, there is emerging a major street and highway plan for the Louisville area.

Too Many Arterial Streets

Early in its work the Sub-Committee recognized that there are at least two things wrong with Louisville's past street development, although individual improvements have been well built and the streets are in generally good physical condition. One, a city-county integrated arterial program has been lacking. The other, is the simple fact that there are too many major city streets over which funds would have to be spread.

As a start in tackling a broad arterial plan, three maps were set up. One shows the Association's proposal of a limited-mileage arterial highway system, with state connections. An-

other shows major connecting highway; a third, proposed major city streets and rural parkways.

Widening of Second Avenue, leading from the Municipal Bridge over the Ohio has already been listed as Louisville's No. 1 project.

Further illustrating the committee's approval is its decision to name 22nd a "major street," in place of 18th or 26th, both of which are now classed as more important. A study proved that 22nd fringing downtown could be widened more economically and will serve traffic needs better.

Charts have also been prepared showing the probable cost of proposed systems. As the arterial system takes shape, it will be systematically published in the newspapers and explained to civic and neighborhood groups. Having grown out of a non-political action by citizens, with sound engineering cooperation, it should be easily sold and necessary bond issues or other sound financing approved without difficulty.

The Louisville Area Development Association has avoided the usual "box car" cost figures. Likewise the overworked term "post-war." The various city departments on request have listed about \$80,000,000 worth of needed improvements. Any immediate after-war program for Louisville, however, would be more in the range of \$10,000,000. Louisville's chief engineer J. B. Wilson and director of Works Roy Burks right now have the problem of a nearly empty drafting room. But projects are beginning to take form, and such advance engineering works as personnel can handle will be soundly selected and have strong public backing.

Equipment Maintenance

Preventive Maintenance, New York City's "White Wing" Fleet

First of two articles on the world's largest municipal garage and how it is carrying on under wartime difficulties

THE largest and most highly specialized mechanical equipment shop of any city in America is undoubtedly that of the New York City Department of Sanitation. The Department's Central Motor Shop at 16th St. and Avenue C in lower Manhattan would be expected to have this distinction, since it is the fixin' headquarters for the world's biggest municipal motor fleet, comprising among other units 1500 specially designed street refuse and garbage collection trucks (19 to 24-yd.), 160 or so automobiles and 76 Snogos, along with tractors, draglines and crawler dump wagons at the city's disposal plants, street brooms and other diversified equipment, totaling 3,254 pieces.

This shop has another distinction besides size. It is also one of the best run. Although its work and facilities are so highly specialized that no other city would want to duplicate them exactly, the procedure of operation and

the labor-saving methods and kinks developed within its walls will interest many highway and municipal equipment executives. And no less interesting are the wartime salvage practices.

Preventive Maintenance on 50 Trucks a Day

To begin with, Commissioner of Sanitation Wm. F. Carey, and the entire personnel of the Bureau of Motor Equipment and Maintenance under Ass't to Comm'r Edmond A. Donnelly, are exceptionally proud of their Preventive Maintenance Department, built around the 1500 collection trucks. This is one of several major shop departments. Here in peacetime, throughout the year except during the August vacation and winter overhauling period for snow equipment, fifty trucks a day get an 8-hour going over on the shop's 5th PM floor. In that time the various parts, such as brakes, engine, steering, tires, escalator, carburetion and electrical equip-

ment are checked and adjusted. Then out the trucks go for another 30 days' service. The importance of such a routine, and conversely the seriousness of a lack of one, can hardly be over-emphasized in a big metropolitan city. One day's lag in truck servicing would not be serious, or even a week's, perhaps. But in very little time poor mechanical management can lead to grave breakdowns of municipal service. The alert and vigilant care of New York's White Wing fleet is reflected in the high level of efficiency of this department. New York is known as one of the world's cleanest cities.

P M Routine Begins at 8

Under "PM" Foreman Thomas Baldt the trucks start coming in from 60 district garages at 8 a. m., and by 4:30 p. m., every machine is out that's going out. Since some come as far as 27 miles, and other only a few blocks, timing of arrival is one



One of New York City's 1500 street collection trucks, which are repaired and maintained in the world's largest municipal shop

Loc. #1202 DIST. 7
CAR. 225-619

DATE 12/9/43

CONDITION Good

	Est. No. Hrs.	PREVENTIVE MAINTENANCE	PREVENTIVE MAINTENANCE	Est. No. Hrs.	
Q15	1	Clean and adjust plugs	Inspect Universals	1/2	Q2
Q3	1	Check Ignition	Check Trans. and differential levels	1/2	B9
Q11	1/2	Test lights & gauges	Repair } Inspect } radius rods		B6
Q4-5	1/2	Inspect starter and generator	Check Steering	1/2	O1
F5		Adjust } Fan belt	Drain crankcase and refill	1/2	H14
F2		Tighten water pump gland	Clean oil filter	1/2	L11
F7		Tighten hose connections	Clean } Inspect } Air Cleaner	1/2	L8
L5	1/4	Clean fuel pump Strainer	Check radiator anti-freeze		F7
L1		Adjust } Carburetor	Check doors-locks windows	2	C4
R4	1/2	Check front wheel bearings	Inspect hoist and connections	1/2	U6
CC	1/2	Adjust clutch pedal	Inspect hoist power take off shaft	1/2	U5
K6		Tighten all U bolts	Repair } Inspect } tailgate	6 1/4	G2
R11		Tighten wheel lugs	Repair } Inspect } plow hoist		T16
E10		Tighten axle flange nuts	Inspect body doors and latches	1/4	G1
D3	1	Tighten service brakes	Inspect air Compressors	1/4	D14
D4	1/2	Tighten parking brakes	Inspect air brake chambers		D14
D12		Inspect brake fluid cylinders	Inspect air brake valve	1/4	D14
R7		Tire Pressure	Clean flusher Strainer		T15
U11	2	Inspect Escalator Drive	Check spray Equipment		T1-2
D14		Check oil going into compressor	Remove front wheels and repack		R5
H2		Check valve Clearance	Check gas and oil leaks		L6 H6
J1		Repair fenders	<u>Body Pads</u>		1/4 C1
J8		Repair side Step and ladder			

Form used by the Dept. of Sanitation Central Motor Shop in ordering and recording minor repairs involved in preventive maintenance

of the many details carefully planned in advance. Each driver is instructed just when to arrive. On arrival the trucks are taken up by three spacious elevators, and driven into wall spaces of which there are 51.

Each machine is inspected and sent to its stall—always the same stall each trip in, since the same team of mechanics always works on it. Thus each mechanic has the same 30 machines in monthly rotation, and comes to know their idiosyncrasies, as with a family physician. There is a mechanic for each truck, 3 electricians for each side of the floor, 4 welders and 2 blacksmiths for the whole floor, 2 wheelwrights (doors and glass) and 3 batterymen. Two foremen supervise the respective sides, under a general foreman.

A crew of three mechanics usually gets two early arrivals and one from a distant garage, two of the three men being ready to team up on the latter when it comes in, as it must go out first in order to arrive to its district within operator's work-day period.

Two men do nothing all day but inspect oil and change when neces-

sary. Oil is brought from the storage room on a specially designed dispensing tank on wheels.

The driver himself does the greasing under mechanic supervision. To speed the greasing job, a specially designed central high-pressure greasing system has been installed. Overhead grease distribution lines come

down at floor column, spaced every third machine. (A compressor with an automatic cut-in sends the grease pressure quickly back to 3000 lb. whenever it falls to 2600 lb., to insure greasing uniformity.)

The electricians' procedure each morning is to walk along the floor and throw every light on. One man changes all dead bulbs, and in doing this checks voltage regulator. A batteryman goes along.

The mechanics, too, have a specific routine. They first get at the escalator or loading chains, which must be inspected and repaired by 10 a. m., then the body hoist is raised and a safety block set, so that work on the chassis may proceed. Brakes are checked, likewise steering and alignment, ignition, gas system, motor compression, tires, etc., etc., all to a check list.

Motor inspection is routinized. For example, plugs are removed, cleaned and gapped every 3rd trip, valves checked every third month.

Each side has one fellow whose job is to anticipate parts needs and keep bringing them up. Some fast moving parts, such as filter cartridges, etc., come from the P M stock room on the same floor, where fast-moving items are kept; others from the 3rd floor purchase dept. storehouse. Lockers placed every 5th or 6th stall along the floor keep gaskets, bolts and other constantly used items on tap to speed the work. There is even a small lathe here for quick minor repairs, although any truck in need of serious repairs is held over and sent to another floor. Sometimes wheels will be pulled and new brake shoes installed on P M, but there's time for only a limited amount of such heavy work.

The regular P M crew consists of auto machinists, auto mechanics,



In the N. Y. C. shop, tires are chalked up thus so that drivers can be promptly "nailed" for careless rubbing of tires against curbs. (Actually this is white paint. Neat idea)

TYPICAL DIESEL LUBRICATION PROBLEMS:

1. Port Clogging

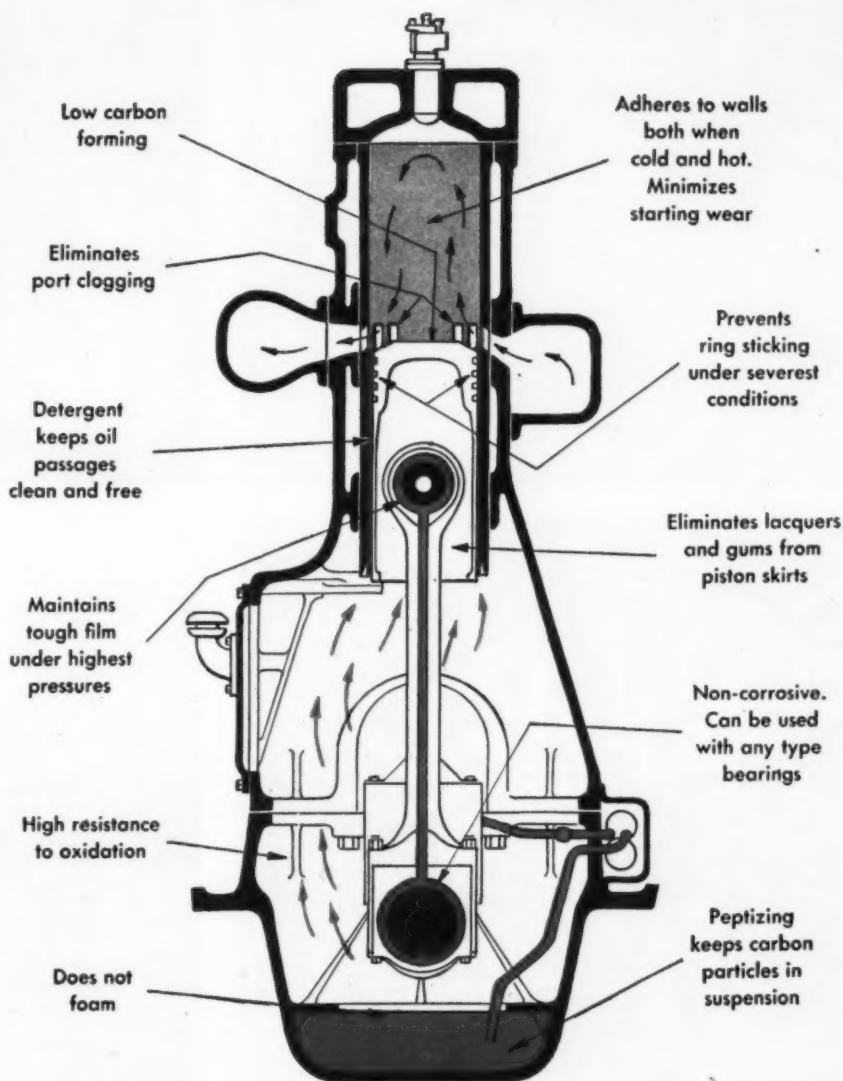
The plugging of intake and exhaust ports is frequently a factor in the operation of two-cycle Diesel engines.

Port clogging results from the combination of fuel soot with the residues of oxidized lubricating oil, which acts as a binder to plug the port openings. This clogging, of course, results in a sharp drop in efficiency.

In simplified form, the deterioration of lubricating oil in an engine involves a combination of oxygen and oil at high temperatures. As the oil continues to absorb more and more oxygen, acids called "oxyacids" are produced. These oxyacids tend to polymerize or form very large, oil insoluble molecules. These form the binder for the deposits on intake and exhaust ports.

The problem, then, of eliminating these deposits may be solved by the use of a lubricating oil properly compounded to prevent it becoming a binder. RPM DELO accomplishes this in four separate ways.

1. RPM DELO is manufactured from a carefully selected base oil containing natural inhibitors highly resistant to



Diagrammatic sketch of 2-cycle Diesel, showing the typical location of intake and exhaust ports and the advantages obtained from the use of RPM DELO.

oxygen. It contains no heavy residues which may be left behind to act as a binder for the fuel soot.

2. RPM DELO contains a powerful oxidation inhibitor, which greatly reduces the rate at which the oil absorbs oxygen.

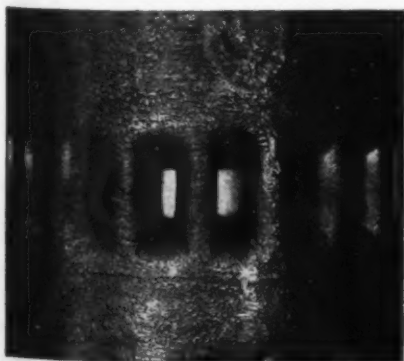
3. RPM DELO has chemical detergent properties. The compounding material reacts with the oxyacids to render them essentially inert so that they are no longer able to polymerize to form gums and lacquers.

4. RPM DELO has peptizing properties which enable it to maintain soot and oxidation products in suspension in mi-

nute particles. This prevents these materials from settling from the oil and forming engine deposits.

The elimination of port clogging, is, of course, only one of the valuable properties of RPM DELO. It also minimizes ring and cylinder wear, eliminates ring sticking, prevents excessive deposits on rings and will not corrode bearings.

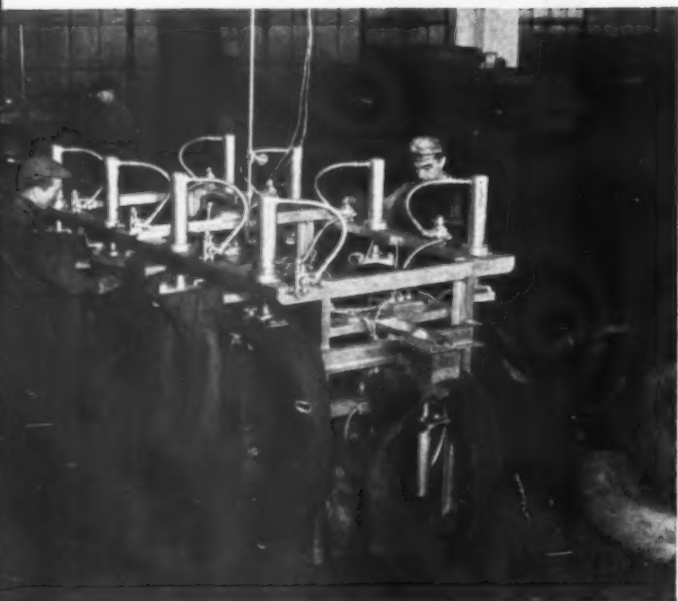
RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial-RPM DELO (concentrate).



Unretouched photo shows air ports from 1000 h.p., 12-cyl., 2-cycle Diesel streamliner locomotive after being lubricated with RPM DELO for 127,590 miles. This is typical of absence of port clogging experienced when RPM DELO is used.

STANDARD OF CALIFORNIA

ROADS AND STREETS, April, 1944



(Above): Specially designed lifting device aids speed greasing, in connection with P M routine on passenger cars. Also hydraulically operated, made from salvage materials. It comprises gears from an old Nelson loader, truck jacks from an old GMC, etc. A drag bar and shut-off valve hold in any position as a safety measure in case hose line breaks beyond the valve

(Below): Another shop-designed labor saver aiding N. Y. Co.'s maintenance and repair work is this tube vulcanizer. Air power is employed to maintain pressure on heating elements, air being furnished by old

hydraulic jacks converted to pneumatic. Has paid for itself many times in 6 years

(Above): Designed by Lincoln Engineering Co. in collaboration with shop personnel, this 4-unit central pressure-greasing outfit feeds grease through an overhead steel piping system to hose outlets at column bases around the P M floor. The compressor cuts in automatically when grease-line pressure falls to 2600 lb. and raises it to 3000 lbs.

(Below): A mechanical truck-tire press, designed by Chief J. S. Plumeau in the Central Motor Shop

machinists, machinist helpers, blacksmiths, blacksmiths helpers, auto electricians, electrician helpers, sheet metal workers, gas and arc welders, wheelwrights, carriage upholsterers, rubber tire repairers, and a battery constructor.

Card Says When to Do What

The foreman keeps tab on all this hustle and bustle by means of a card system, itself a very special development and of course tailor-made out of experience for this shop's needs. For each machine there is a card showing machine number; kind of unit; mileage last time in; mileage when due in again; stall no.; motor

no.; names of mechanics who worked on it last; write-in black space.

Central "switchboard" for all operations is a large master chart in the foreman's office. On it is spotted every machine's number and its assigned district. A horizontal rule placed across the chart gives a list of the equipment numbers due for inspection on any given day of the month, while shown vertically in any column are numbers of all the machines in a given district. A code letter indicates whether a machine is out of service, and why.

A code in the office also shows what P M machines each day are held over for further repairs and why.

(A for accident, B body, Br brakes, C clutch, Cb cab, etc.).

There is also a Charge-Out Sheet for all the units of any one type, covering the 10 working months of the year. A working sheet goes to the district garages and shows when units are due in for a P M.

All this, as was said, is a peacetime routine. Today the system is being operated somewhat catch-as-catch-can because of war conditions. Drawing of skilled men into war industries has hampered the entire work of the Central Motor Shop, though not as seriously perhaps as in some other city garages. Major repairs and overhauls have become

DEPARTMENT OF SANITATION
Bureau of Motor Equipment and Maintenance
Code for Preventive Maintenance Record

BLUE: Unit
BLACK: Adjustment and Repairs
RED: Repetition and comeback

GREEN: Road-Service
BROWN: Tow-In

A AXLE, FRONT	D BRAKES (Cont.)	G ELECTRICAL (Cont.)
1 Overhaul	6 Br. Shift & Cont.	9 Switch
2 Tie Rod	7 Clean Grease	10 Batt. & Cables
3 Knuckles	8 Booster	11 Wire all lights
4 Spindles	9 Mechanism	Test all lights
5 Adjust	10 Rel. Emer. Valve	12 Wire dist & Plugs
6 Draw Keys	11 Appli. Valve	13 Hdlights & Brkts.
7 Straighten	12 Brake Hose.	14 Timing
8	Fluid lines	15 Spark Plugs
9	13 Hydraulic-	16 Horn
	(Master Cyl.)	17 Bendix
B AXLE, REAR	14 Air Compressor	18 Run. Lights
1 Overhaul	" Brake Chambers	Tail lights
2 Housing	" " Valve	19 Ammeter & Instru-
Torque		ment-Panel.
3 Differential		20 Heater
4 Axle Shaft	E CLUTCH	Defrosting fan
5 Ring & Pin Gr.	1 Overhaul	
6 Radius Rod	2 Adjust	
7 Grease Leak	Renew	
8 Trailer	3 Bearing	
9 C'k Oil level	4 Pedal	
10 Flange Nuts	5 Shaft	
	6 Rod	
C BODY	F COOLING	H ENGINE
1 Rep. Body	1 Radiator	1 Overhaul
2 Rep. Tailgate	Guard	2 Valves
3 Cab.	2 Water Pump	3 Pistons
Signal Arm	Manifold	4 Rings
Wiggler	3 Water Hose	5 Rods & Brgs.
Upholstery	Connections	6 Heads
4 Door & Glass	4 Fan Assembly	7 Gaskets
5 Floor	5 " Belt	8 Oil leaks
6 Hood	6 Heater	9 Tune
7 Hood Sill	7 Alcohol	10 Oil Pump
8 W.S. Wiper	8 Winter Front	Cooler Unit
9 Mirror	9 Thermostat	11 Supports
10 W.S. & Glass		12 Clean Carb.
11 Reflector		13 Flywheel
12		14 Change Oil
	G ELECTRICAL	Clean Crankcase
D BRAKES	1 Overhaul	Screen
1 Bellows Serv.	2 Distributor	15 Valve Tappets
2 Bellows Emerg.	3 Magneto	16
3 Adjust Serv.	4 Generator	
Pedal	Voltage Regulator	
Pads	Pulley	
4 Adjust Emerg.	5 Starter	
5 Drums	Starting Motor	
Shoes	6 Points (Contact)	
	7 Condenser	
	8 Coil	

-Page 2-

J FENDER	M SPRING	R WHEELS (Cont.)
1 Repairs	1 Repair	5 Felts
2 Supports	2 Bolts	Remove Wheels
3 Brackets	3 Clips	and Repack
4 Run. Boards	4 Shackles	Clean Grease
5 Shields	5 Reach	7 Tires
6 Hood	6	8 Odometer
7 Install	7	9 Chains
8		10
K FRAME	O STEERING	S TOW
1 Cross Member	1 Overhaul	1 Shop
2 Spring. Brkts.	2 Adjust	2 Ditch
Saddle	3 Pitman	3 Accident
3 Brackets	4 Drag Links	4 Turn-over
4 Bumpers	5 Fall Studs	5
5 Grease Figs.	6 Tighten	6
6 U Bolts	7 C'k Oil Level	
7 Strghtn Frame	8 Tie Rod	
8 Tow Hooks	9	
9 Shock Absorbers		
L FUEL	P TRANSMISSION	T TANK & EQUIPMENT
1 Carburetor	1 Overhaul	1 Spray Nossle
2 Choke	2 Gears	Brackets
3 Gaskets	3 Bearings	2 Sprinkling Nossle
4 Vacuum	4 Shift Rod	3 Tank Delivery Hose
5 Fuel Pump	5 " Forks	4 Pipe Line Connections
Sediment Bulb	6 Speedometer	5 Tank Mounting
6 Gas Lines	7 Cover	6 Pump
7 Tank	8 Oil leaks	Pack Flusher Pump Gland
8 Air Cleaner	Gas leaks at	7 Power Take-Off & Pump-
9 Governor	Flusher Pump	Driving Parts
10 Accelerator	Transmission	8 Valves
11 Oil Filter	9 Oil lever	9 Hose Rack
12 Gauge	(c'k)	10 Dome Covers
13 Heater		11 Compartment Repairs
14 Spark Control		12 Tank Holddown Clips &
15 Oil & Gas Gauge		Bands
16 Oil Cooler		
M LUBRICANT	Q UNIVERSAL	U DUMP BODY
1 Truck	1 Overhaul	1 Hoist Control
2 1000 Mi. Insp.	2 Propeller	2 " Oil Line
3 5000 Mi. Insp.	Shaft	3 " Oil Tank
4 Chassis & Run-	3 Tighten	4 Pump
ning Gear	4 Joints	5 " Power
5 Oil Pressure	5 Misc'l	6 Hoist
Oil Caps		7 Tail Gate Jacks
		8 Interlock (Safety)
		9

Code for preventive maintenance record, as kept by the Bureau of Motor Maintenance and Equipment, Department of Sanitation, City of New York. Code numbers involved are circled with appropriate colored pencil

the bottleneck, and this work in turn has required taking over much of the floor space as well as personnel of the P M department. The situation has called for exercise of the greatest judgment to keep lay-ups from becoming even more numerous, and has required the manufacture of scarce parts on a volume basis.

(Details of the extremely interesting heavy repair program will be presented in a forthcoming article.—Editor.)

Hydraulic hand operated jack for heavy trucks—one of many novel pieces of shop equipment designed by the Central Motor Shop personnel and often built entirely of salvage parts and metal. This jack raises on the inclined plane principle



Check Your Cooling System

Pointers on Maintaining It in
Efficient Condition

THIS is the time of year when the old truck begins to "perk" if you don't watch out. How to keep the radiator and cooling system working at their best is high-spotted by the following suggestions, reprinted from Gulf Oil Corporation's 64-page "Lubrication and Maintenance Guide for Contractors' Equipment," free on request to the firm's Contractor's Sales office, Gulf Building, Pittsburgh, Pa.

Air-cooled engines require little attention in so far as the cooling system is concerned. However, cooling fins cast on the cylinder should be kept free from accumulation dirt, as such dirt will prevent proper transfer of heat from cylinder to atmosphere.

In Water-Cooled engines, rain water should be used in the cooling system if possible, as it is free from harmful minerals which often form scale in the radiator and water jackets. If rain water is not available, clean well water should be used.

In some cases where substantially mineral-free water is not available,

it may be necessary to add special water softening agents to the cooling water.

Flush Often. The cooling system should be flushed at least once a year and more frequently when water of high mineral content is used, particularly under severe operating conditions. This should be done with a good brand of radiator cleaner or, if this is not available, a solution of about ½ lb. of washing soda per gal. of water. This solution can be left in the cooling system during normal operation for 24 hours, after which it should be drained, the radiator flushed, and then refilled with clean water.

It is a good practice to use a high-grade rust inhibitor in the cooling system at all times. Check the level of the fluid in the cooling system at least once each day and, if necessary, add water or anti-freeze solution.

Maintain Correct Temperature

Thermostat. Many engines are equipped with thermostats which are opened fully at approximately 160°F.

If your engine has thermostat it should be checked at least twice a year to make sure that it is operating properly. Some manufacturers recommend that thermostats be renewed at least once a year, preferably in the Fall after the heavy-duty, high temperature summer operation. It is advisable to consult your equipment dealer for detailed information when checking the thermostat.

Radiator Hose and hose connections should be checked periodically. Hose should be in good condition and all connections should be tight.

Lubrication of Water Pumps

Water Pumps should be properly lubricated, for the use of an improper type or excessive amount of lubricant may result in the lubricant passing the oil seals and entering the cooling system. When this occurs, a coating may accumulate on the coils of the cooling system which will retard flow of heat from cylinder head and cylinder wall to cooling water.

Water pumps requiring lubrication attention may be lubricated by means of oil cups, grease cups, or pressure fittings. For water pumps equipped with pressure fittings, furnish only one shot of lubricant each time of service. If grease cups are provided, one or two turns of the grease cup at each lubrication service period are sufficient. While you should avoid getting too much grease into water pumps, remember it does require some lubrication at regular intervals, unless the water pump bearings are of the non-lubricated type.

A good waterproof grease is recommended for water pumps equipped with pressure fittings or grease cups. This grease must resist the high temperature of the cooling fluid to a high degree.

Be sure that oil cups are filled with a lubricant specially selected for the season of the year.

Certain designs of water pumps may require special lubricants for ball bearings. Others may have sealed bearings requiring no lubrication attention. Consult the manufacturer's instruction book furnished with your tractor for the proper type of lubricant for water pump lubrication.

It is important that fan belts be properly adjusted, as a slipping fan belt may result in overheating of the engine.

Overheating may also be caused by too lean a fuel mixture or by use of a fuel having a low antiknock value which results in knocking and subsequent overheating. If the fuel is the cause of overheating, the engine will knock for some time before overheating.

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5 lbs. 5/32x18"

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Tips from Scraper Operators

Is your scraper equipment being run at very best efficiency? The following prize letters published in "The Co-operator," a magazine for earth-moving equipment operators issued by R. G. LeTourneau, Inc., Peoria, Ill., contains mighty practical suggestions:

From J. C. Bunyard (1st Prize)

"1. When the big dual rear wheels of a Scraper are in muddy or sticky going and pull a little bit heavier than usual, back up about two feet. This unloads all the mud which will pile up against the frame over the wheels.

Set Your Cables Right

"2. Most operators do not know they have the tailgate and apron cables on the model FP Scraper set right. Always remember that the tailgate is supposed to come all the way to the front of the Scraper, up flush against the front bumpers and not stop about four to six inches back from the front. But always remember you do not want your tailgate to bump too hard at the front. Just flush will turn the trick and save quite a few of the small cables. The same thing applies to the apron. You do not want the apron to touch the apron sheaves—just come up to within an inch or so. That's plenty close. Then dump or sticky dirt will pour right on out.

Tips on Jack-Knifing

"3. A lot of operators make a bad mistake in jack-knifing their Scap-

ers. They get the cables tangled up when they jack-knife real short. Jack-knife when the driver is on the shoulder of the cut, hole, or fill, then the cables will always clear. The reason this is so is because the last sheave on the hoist side of the Scraper is always a few inches higher than on the dump side. This allows the hoist cable clearance for raising or lowering the bowl. When you jack-knife the wrong way, the hoist cable has a tendency to get under the last dump sheave on the Scraper, more so if you jack-knife real short, or if you raise or lower your bowl. Then if it is hung, when you straighten your tractor and Scraper either way, up or down, the cable guide will really cut the cable smooth, and you will have a re-thread or pull-through job."

From Cliff Anderson (2nd Prize)

"I have information I would like to pass on to new and some old pusher operators. Always keep the blade as low as possible when pushing. By so doing, you get the full power of your tractor, and you don't have to pull your swing clutch lever so often to keep from stalling. Also, when the blade is low, the Scraper loads better because full power from the pusher is delivered to the Scraper.

"I noticed that many pusher operators kept their blades high as possible, which takes away a large percentage of power, and also keeps the operator pulling his swing clutch lever to keep from stalling."

Interpretations on Construction Contracts

Construction contracts awarded as a result of competitive bidding are specifically exempted by the Revenue Act of 1943. Necessarily any such general provision must be further amplified by rules and interpretations before the extent of its application can be ascertained. To this end the War Contracts Price Adjustment Board recently issued several interpretations dealing with the exemption of construction contracts from the renegotiation law. The text of these interpretations follows:

"The provisions of subsection (c) (6) of the Act serve to exempt from renegotiation contractors or subcontractors whose aggregate receipts or

accruals from contracts with the Departments and subcontracts as defined in the Act (whether or not such contracts or subcontracts are subject to renegotiation but excluding subcontracts described in subsection (a) (5) (B) do not exceed \$500,000 in any full fiscal year ending after June 30, 1943. No determination of excessive profits shall be made in an amount greater than that which, when deducted from such aggregate amount, will reduce it below \$500,000.

"In the case of a fiscal year of less than 12 months, ending after June 30, 1943, this rule is applied on a pro-rated basis."

"The exclusion from renegotiation of construction contracts with a department awarded as a result of com-

petitive bidding applies only to contracts for the construction of buildings, structures, improvements and other similar facilities let to the lowest qualified bidder and which were entered into after advertisement and for which bids have been received from two or more independent, responsible and qualified contractors in actual competition with each other.

"This section of the Act is applicable only to amounts received or accrued under such contracts for fiscal years ending after June 30, 1943, and applies regardless of the date when the contracts were made.

"Contracts for the furnishing of materials or supplies or for the lease or sale of machinery or equipment are not deemed to be within the scope of this provision of the Act."

"The Board adopts the following discretionary exemption with respect to construction contracts entered into subsequent to June 30, 1943. The Board has found that competitive conditions affecting the making of construction contracts and subcontracts entered into subsequent to June 30, 1943, were such as to result in effective competition with respect to the contract or subcontract price where all of the following conditions exist:

(1) The contract or subcontract is one for the construction of buildings, structures, improvements, or other similar facilities. Contracts and subcontracts for the furnishing of materials or supplies or for the lease or sale of machinery or equipment are not within the scope of this exemption.

(2) The contract was entered into subsequent to June 30, 1943, and did not constitute a substitute for or a revision or extension of an existing contract entered into on or before June 30, 1943.

(3) The work covered by the contract was substantially the same as the work for which the bids were requested.

(4) Bids were received from two or more responsible and qualified contractors, who were independent of each other and were in actual competition with each other for the work for which bids were requested.

(5) The contract price was not in excess of the low bid received.

The secretaries of the departments to which the assignments for renegotiation are made are authorized to interpret and apply the exemption and to redelegate this authority and to authorize further redelegation."

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BEAT 'EM
WITH BONDS

ROADS AND STREETS, April, 1944

Raybestos

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New Equipment and Materials

New Resin Compound for Soil Stabilization

A new resin combination for use in soil stabilization has been announced by the Hercules Powder Co., Wilmington, Del., following several years of research in the laboratory and in the field. This product, known as Stabinol, is a combination of a specially treated resin and other chemicals in the form of a dry powder suitable for easy mixing with soil. The chemical and physical proportioning of the several ingredients are carefully balanced to obtain the maximum effect desired.

It is claimed that Stabinol, when mixed with soil, makes it waterproof by effectively preventing the penetration of surface water or the capillary rise of moisture from below. When this effect is achieved, the soil retains adequate load-bearing strength. This stabilizing effect is stated to last for years. Roads treated with resin stabilizers more than 5 years ago, for example, are still waterproofed.

The amount of Stabinol required varies with the chemical and physical properties of the particular soil, as well as with the severity of the exposure to be encountered. Usually the amount is about 1 per cent of the soil treated. A highway in a Southern state required 6 lb. of resin stabilizer per square yard for a compacted depth of 6 in., whereas an athletic field in another state was stabilized to a depth of 3 in. in the proportion of 1½ lb. of stabilizer to a square yard of soil.

The advantages claimed for Stabinol include:

It is effective in a wide range of natural soils.

The quantity of resin required is very small, and the material itself is quite inexpensive.

It is added as a dry powder; is readily spread and mixed with ordinary road-building equipment.

Soils which have been mixed can be stock-piled or reprocessed at any time without loss of effectiveness.

It is particularly adaptable to soils with relatively high silt or clay content.

When used in the soil base on roads where a hard wearing surface is to be applied, Stabinol is claimed to offer these added advantages:

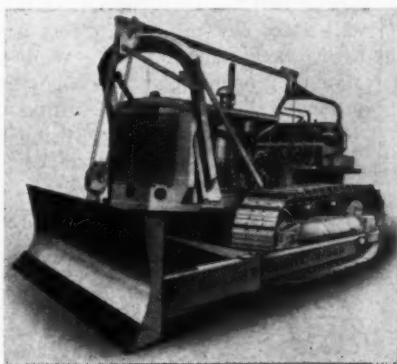
The treated soil will shed rain so that sections already compacted but not primed or covered need not be reworked after a period of wet weather.

These sections may be used for construction traffic immediately after rain without danger of bogging down or rutting the surface.

The base will dry faster since surface water will not penetrate, and drying achieved between rainfalls is retained.

New Trailbuilder

Another post war earthmoving unit has just been announced by LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa. This is a cable-operated "Trailbuilder," designed as model R-82R, and designed for mounting on "Caterpillar" D-8 tractor. The unit retains all the unique structural features of this company's dozer line—welded steel construction, box channel frame, box plate blade, pressed and formed sections. The cutting edge has been reinforced with more bolts compared with earlier models, while the cutting bits at either end of the blade are single plates formed to fit the ends of the blade for greater wear resistance in rock cuts. The front overhead is a new design for increased strength and better appearance. An outstanding feature of this Trailbuilder is its simple and positive op-

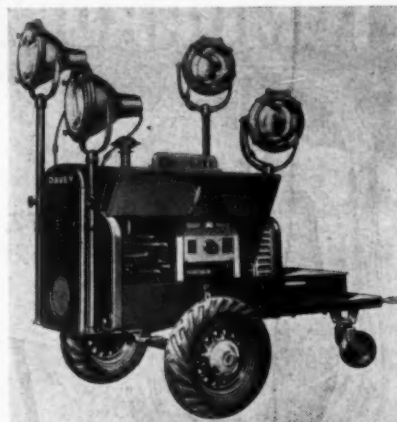


Model R-82R Trailbuilder

eration. The three-position blade can be positively angled either to right or left, or held in straight bulldozing position. Either end of the blade can be tilted up or down with a variation of 14 in. while in straight bulldozing position as well as when the blade is in either angling position. This is accomplished quickly by pulling two pins. The blade can be raised a maximum of 50 in., or dropped 72 in. below the ground line. This movement is accomplished by means of "Caterpillar" double drum power control unit. A single cable is used.

New Portable Light and Power Unit

A new portable light and power unit, the Da-V-Lite, has been placed on the market by the Davey Compressor Co., Kent, O. In this unit a heavy-duty, 4-cylinder, V-type, air-cooled engine operates a Westinghouse single-



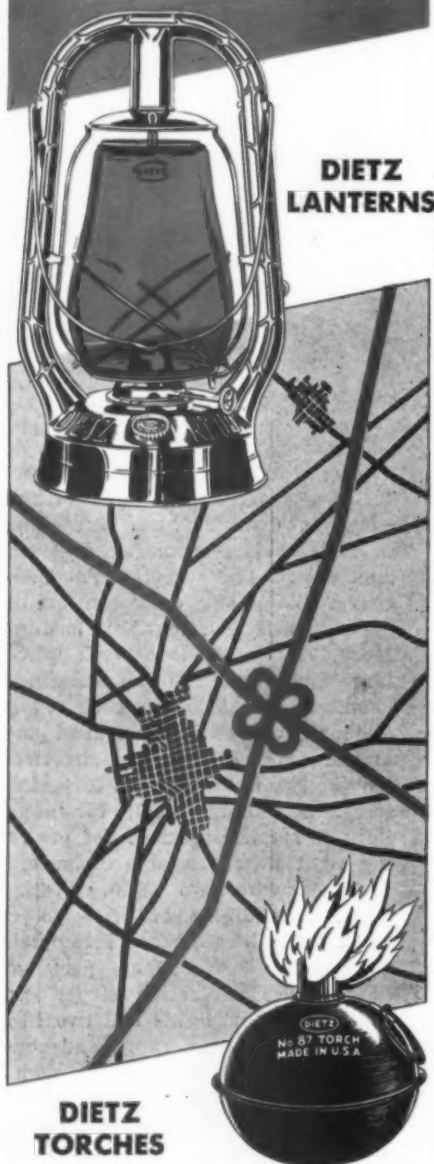
Portable Da-V-Lite Unit

phase, 60-cycle, 120-volt generator delivering 5 KW. for lighting or power. The Da-V-Lite is available in four models, any of which may be obtained with either skid mounting or spring mounted on two wheels. (Pneumatic tires available only on war orders under present regulations.) "Floodlight Model" is designed to work-light a large area; four 16-in. Westinghouse floodlights of 35,000 cp. each are individually operated from control panel and are adjustable in all directions; may be raised to height of 9 ft. if desired. "Searchlight Model," for intense light on smaller areas or for projecting light a considerable distance, is equipped with two 18-in. Westinghouse searchlights of 1,935,000 cp. each. Special equipment is available to provide 3,225,000 cp. per light. "Standard Combination Model" provides two 16-in. lights and two 18-in. lights, with control range and power as mentioned above. "Beacon Model," for directional lighting at airfields or for emergency work in coastal areas, is equipped with one 24-in. searchlight of 11,280,000 cp. Illuminated Westinghouse control panel makes operation safe and trouble-free. Two 30-amp. double receptacles for operating power tools are furnished.

New Welding Electrodes

The Anthony Carlin Co., Cleveland, O., has announced four recent additions to its line of "Perfection" welding electrodes. Grade P-61 is a shielded arc, general purpose, straight polarity D.C. electrode for welding mild steel in all positions. It is designed especially for fast production where

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**DIETZ
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Jobbing Trade Exclusively.

ROADS AND STREETS, April, 1944

high currents are used and the arc action is strong. It meets the requirements of A. W. S. Classification E6012. P-103 is a shielded arc A.C. electrode suitable for all position welding. It meets the requirements of A. W. S. Classification E6011 and A. S. M. E. Par. U-68. This electrode is also suitable for welding the low-alloy high-strength steels when these steels are used primarily for their high strength properties. P-170 and P-180 are bare and wash coated electrodes meeting the requirements of A. W. S. Classifications E4510 and E4511, respectively. These are straight polarity D.C. electrodes which have a broad field of application where the physical properties indicated in the specifications are acceptable.

New Truck Crane

A new heavy duty P&H truck crane has been announced by Harnischfeger Corporation, Milwaukee, Wis. Its main feature is a carrier built for crane work, not for crane transportation alone. Lower center of gravity gives greater stability in terms of hoisting capacity and boom reach, without the use of outriggers. With outriggers, working range is proportionately increased, and being built closer to the ground, outriggers require little blocking. The problem of sway at the boom point is markedly lessened by a new weavproof frame of all-welded box section construction with a built-in torsional bar. The crane machinery is a standard P&H Model 255-A crane upper, complete with P&H low-pressure, direct acting hydraulic control and triple-safe planetary boom hoist which positively prevents the boom from falling suddenly. Operation is entirely independent of carrier power, with either gasoline or Diesel motor. The entire unit



New P&H Truck Crane

is within standard road clearances, and its comparatively short wheelbase allows greater maneuverability on the highway, as well as on the job. Tractive power is by double drive axles in tandem. Low range transmission with 10 speeds forward and 2 reverse, gives greater pulling power—8 large rear tires provide low ground pressure. Steering is made easy by double cam and roller bearings with 21 to 1 ratio. All air lines, tanks and braking systems are completely protected against damage, yet are fully accessible. The unit can be used for all

types of materials handling work and can be equipped with hook, clamshell, magnet, dragline, etc.

35-Yd. Power Shovel

A power shovel with a dipper of 35 cu. yd. capacity was placed in operation recently by the M. A. Hanna Co., St. Clairsville, O. stripping overburden at the Hanna coal properties near Georgetown, O. The overburden ranges from 25 ft. to 75 ft. in depth. The shovel weighs 1,600 tons and was built by The Marion Steam Shovel Co., Marion, O.

This Marion type 5661 coal stripping shovel, is designed especially for coal stripping service in heavy overburden. It follows a pattern of engineering which has proven so successful on other strip operations, where several such machines have been at work either opening up new properties, or reopening old cuts deemed unprofitable with smaller equipment due to the excessive ration of overburden to the coal.



Coal Shipping Shovel With 35 Cu. Yd. Dipper

Marion engineers have given particular consideration to the front end construction of this machine. They have reduced the weight of the boom by mounting the crowding machinery on the gantry, thus relieving the boom of the stresses and shock imposed by the crowding action. As a result, the boom is comparatively light but with ample strength to meet the most severe digging requirements.

The "Knee-action" front end is another Marion development. It is stated to permit the use of a larger dipper and greater working ranges than can be obtained when the conventional front end design is employed. Because of the movable fulcrum, which corresponds to the shipper shaft, especially favorable digging angles and a long radius of clean-up are obtainable.

Since this machine rests on the coal face in the removal of overburden and must follow the coal pitch, the question of keeping the machine level during travel and operation is of vital

importance. To make sure this huge machine is level, regardless of the contour of the ground, hydraulic equalizing and leveling jacks are provided. The action of the Marion hydraulic jack system is entirely automatic and electrical and is positive in its action in keeping the lower frame level while traveling as well as digging.

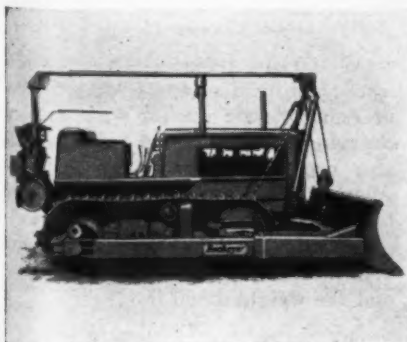
To give this machine the greatest degree of flexibility and maneuverability, the crawlers are so arranged that the belts swivel independently both laterally and transversely. This allows the shovel to conform to the coal surface without imposing undue strain.

New Chemical Loosens "Frozen" Part

A new chemical combination, known as Kano Kroll, for loosening "frozen" metal parts quickly and effectively without harm to metal, has been put on the market by Kano Laboratories, 75 East Wacker Drive, Chicago 1, Ill. A bridge had been exposed to the elements for twenty years when the engineer found it necessary to remove some bolts. It's stated that after applying Kano Kroll the bolts were removed quickly and successfully.

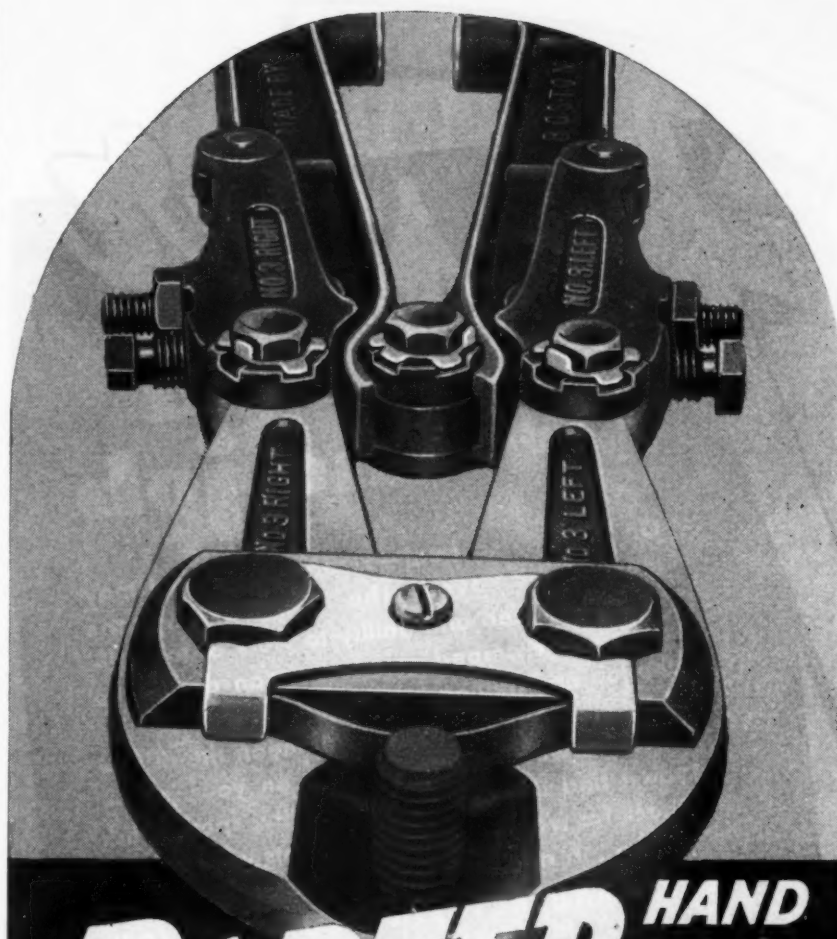
New Bulldozer and Trailbuilder

A new cable-controlled bulldozer and trailbuilder, known as the "Centro-Lif," has been announced by the Buckeye Traction Ditcher Co., Findlay, O. The new "Centro-Lif" is currently offered in two models: one weighing 5855 lb., without the power control unit, for Allis-Chalmers HD-14 tractors, and the other, weighing 5140 lb., without the power control unit, for Allis-Chalmers HD-10-W tractors. Both models are controlled by Buckeye single or double drum power control units. The new design



New "Centro-Lif" Bulldozer

is engine mounted and cable is carried overhead from winch to moldboard. The principal new feature is the center lift construction of the moldboard which is claimed to provide many



PORTER ^{HAND} ^{POWER} CUTTERS

These tools go to the job and are used on the job independent of any power source — except a worker's two hands. This power is so multiplied that an average worker can exert sufficient pressure to "lift an elephant —."

This power delivered at the working head finds many applications in metal cutting and fabricating — emergency, repairs, on construction, shop or production.

The illustration above shows a Porter Bolt Clipper head cutting a $\frac{5}{8}$ " annealed bolt in the thread. In addition to standard tools for cutting wire, cable, chain, flat bars, splitting nuts, etc., there are special tools for Heading, Pressing, Crimping, Punching, Caulking.



FREE — Write for Free copy of Tool Maintenance Book — boiled down essence of practical experience in use and care of clippers, saws, chisels and other hand tools. A post card request will bring it postpaid. Also write for catalog of Porter line of Cutters.

H. K. PORTER, INC., 426 Ashland St., Everett 49, Mass.

PORTER ^{HKP} CUTTERS

Faster

On and off the job

On the fighting front—where time saved may mean lives saved—the Insley Excavator's mobility, speed and ability to work at top efficiency in cramped quarters mean getting to the job and getting it done—faster!

Tomorrow—when time will mean the difference between profit and loss on your jobs—you'll find that this same mobility, speed and knack for working in the tight spots will get you on the job and OFF the job—faster!

INSLEY MANUFACTURING CORPORATION
INDIANAPOLIS 1, INDIANA

EXCAVATORS • CRANES • BUCKETS • CARTS
INSLEY
CONCRETE PLACING EQUIPMENT

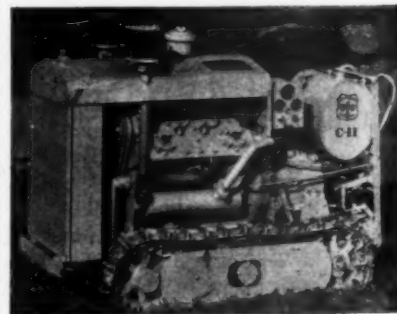


For the duration, $\frac{3}{8}$ - $\frac{1}{2}$ yd. Insley Excavators will not be available. Concrete and readymix buckets can be supplied.

advantages: light weight for its size, simple construction, and straight lift of the blade. The horn is designed so that the moldboard is close to the tractor radiator. The push arms are so constructed that the moldboard pivots about a single king pin and can be angled to the right or left simply by removing two landside pins, swinging the moldboard to the desired side, and replacing the landside pins. The moldboard can also be easily tilted by means of a double trunnion mounting of the push arms. By attaching one push arm to the top trunnion on one side while the other arm is mounted on the lower trunnion on the opposite side, a vertical adjustment of 12 in. at end of moldboard is provided. Maximum height of lift of leading corner of blade is 53 in., while digging depth of blade below grade is unlimited. Trailbuilder moldboard is 12 ft. 9 in. long and 37 9/16 in. high and is fitted with reversible cutting edge and replaceable corner bits.

New Self-Propelled Compressor

A 60 cu. ft. self-propelled crawler type compressor has been added to the line of Schramm, Inc., West Chester, Pa. This is a small, hard-hitting, powerful compressor that can be transported under its own power in rough, unbroken terrain. The unit is a completely automatic outfit with mechanical drive, three speeds for-



Self-Propelled Crawler Mounted Tractor
ward and one reverse. The standard equipment includes engine driven compressor, electric starter with battery charging generator and battery radiator cooling unit with fan and circulating pumps, air receiver and fuel tank, mounted on self-propelled crawler. The length is 57 in., width 26 in., height 42 1/2 in., fuel tank 10x24 in., and the weight 1,800 lb.

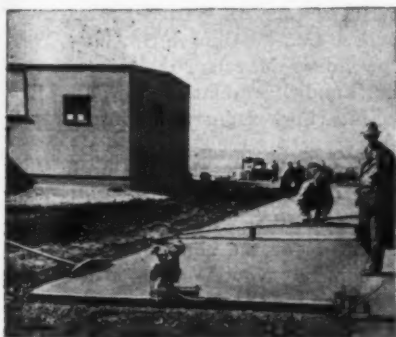
New Continuous Printers

Two table-type continuous printers have been developed by Peck & Harvey, 4327 Addison St., Chicago. These "B-1" and "B-2" models produce clear, sharp blue prints or direct process black and white prints up to 44 in.

wide in any lengths at a speed up to 42 per minute. The printers are compact, easily portable—can be placed on any convenient table or bench—are simple and easy to operate and maintain—are sturdy and highly efficient. No special wiring required—simply plug into any standard electric outlet. They take cut sheets or continuous rolls. Any drawing or tracing, or printed matter up to 44 in. wide, or any combination (as many as five $8\frac{1}{2} \times 11$ sheets) may be fed into the machine at one time. Prints any length continuously, without side travel, blurring, or wrinkling. Use of Cooper-Hewitt mercury vapor tube lamps mounted horizontally gives absolute uniform light intensity overall. Super-Clear, hand polished contact glass and sliding contact insure clear, clean overall exposure.

New Vibratory Concrete Finishing Screed

A new vibratory principle recently developed by the Master Vibrator Co., Dayton, O., is built into their new vibratory concrete finishing screed. Available in 6 ft., 10 ft., 13 ft., 16 ft., 20 ft., and 25 ft., models, each adjustable in width, this new vibratory screed is stated to assure uniform vibration throughout its entire span and to provide accurate strike-off and compaction in a single easy operation. Gas powered models are effectively powered by $1\frac{1}{2}$ HP, air cooled, variable speed Briggs Stratton gasoline engines, featuring Master Automatic Clutch, special vibrating element, and V-belt drive. Vi-



New vibratory concrete finishing screed vibrating speed is adjustable from 2,000 to 6,400 R.P.M. to assure adequate vibration for extreme cases where slabs are heavy and low slump concrete is used. Electric powered models are powered by two $\frac{1}{2}$ HP Master electric motors giving two operating speeds of the vibrating element. These speeds controlled by a three pole switch are 3400 R.P.M. and 4,500 R.P.M. furnishing adequate vibration for initial strike-off and a lesser amount of vibration for precision finishing.

A LOW COST METHOD FOR LENGTHENING ROLLER LIFE

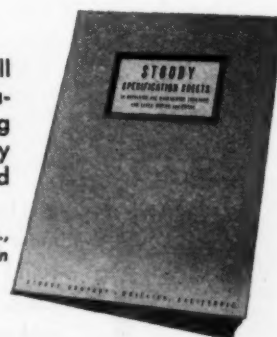
Brief Facts FOR TRACTOR OPERATORS



- ▶ Stoddy Self-Hardening is a special wear resistant alloy with a high chromium-manganese content. Tractor rollers rebuilt with Stoddy Self-Hardening outwear new factory rollers or those rebuilt with ordinary welding materials two to one!
- ▶ Large rollers can be completely salvaged with only 6 to 8 lbs. of $3/16"$ Stoddy Self-Hardening.*
- ▶ With double the roller life, one complete overhaul is saved with no loss in down time.
- ▶ Cost of Stoddy Self-Hardening per roller is only \$3.00 to \$4.00—or approximately 1/10 the cost of a new roller!

This money saving hard-facing application as well as a dozen others are covered in "Stoddy Specification Sheets," an engineering data series describing and illustrating procedures on many types of heavy equipment. Sent free on request—simply fill in and mail the coupon today.

* $3/16"$ Stoddy Self-Hardening is priced at 50 cents per lb., F.O.B. Whittier, California—available through distributors in all principal cities.



STODDY COMPANY
1125 W. SLAUSON AVE., WHITTIER, CALIFORNIA

STODDY HARD-FACING ALLOYS
Retard wear... Save Repair

CORONACH

*"Of these immortal dead who
live again
In minds made better by their
presence."*

EDMUND A. BONNEY, co-author with Wilson G. Harger of the well known Handbook for Highway Engineers, died March 31 at his home in

Larchmont, N. Y. He was 63. Mr. Bonney attended Rensselaer Polytechnic Institute and later was engaged in highway construction as engineer for the New York State Highway Department. Since 1922 he has been eastern sales manager for the Austin-Western Road Machinery Co., with offices at 475 Fifth Ave., New York.

E. L. BROWN, city engineer of Coffeyville, Kan., died last month. Mr. Brown was a graduate of the University of Kansas and served with the 110th Engineer Battalion overseas in the first world war. He was

appointed city engineer of Coffeyville April 26, 1927. Previous to that he was a construction engineer of the Kansas State Highway Department.

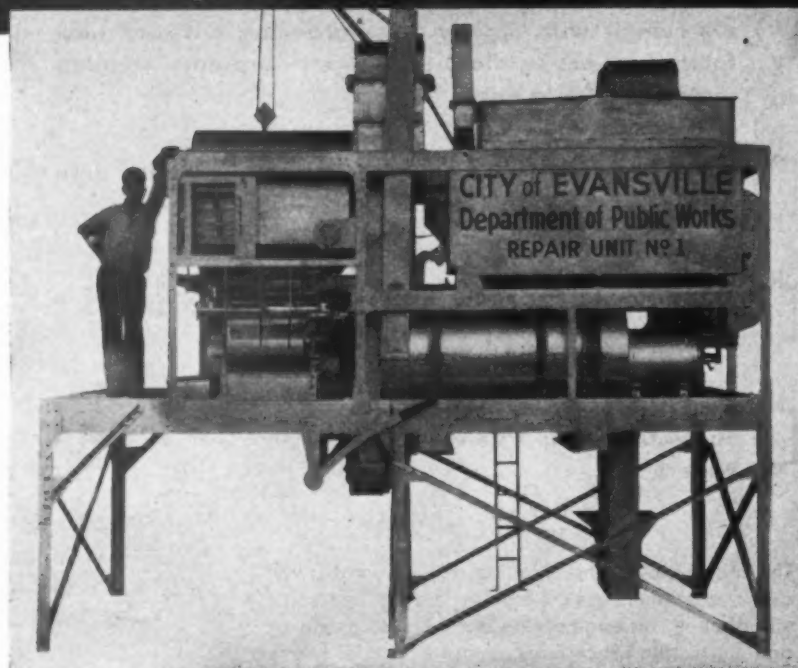
CLARENCE HEALY, Division Engineer of the Reconstruction Finance Corporation in New Jersey and Pennsylvania, died March 28. He had been vice president of Linde & Griffith Co., contractors, Newark, N. J., and was formerly president of the Hodgson Sand & Gravel Co. of Stanhope, N. J. He was a supervising engineer on the construction of Newark Airport and before the war was consulting engineer for dock building concerns. He was construction engineer for several New York World's Fair projects.

FRANK M. JOHNSON, U. S. Supervisor of Surveys, Denver, Colo., died March 20. He was born in Berryville, Va., Nov. 4, 1872. After graduating from the Corcoran Scientific School, now known as George Washington University, he became affiliated with the U. S. Geological Survey, later becoming examiner for the department. In 1903 he served with the British government as an engineer on the mission to select a site and build the Assouan Dam. In 1905 Mr. Johnson opened a private engineering practice in Cheyenne, Wyo., and five years later he became supervisor of surveys for the Department of the Interior.

CHARLES W. LANDIS, contracting engineer for the United States Steel Export Co., 30 Church St., New York City, died March 20. He was 67. Mr. Landis graduated from the civil engineering department of Cornell University in 1900. He then became a draftsman for the McClintic-Marshall Construction Co., at Pottstown, Pa., and then was a construction engineer for the concern. After that he came to New York as a designing engineer for the American Bridge Co., a United States Steel subsidiary. Mr. Landis had been with the export company since 1906.

EARLE L. NEVILLE, Engineer with Foley Bros., Inc., St. Paul, Minn., died last month, aged 46. He had charge of many large contracts of Foley Bros., Inc., among the most recent of which was the Twin Cities Ordnance Plant at New Brighton, and the Haines Cut-off project in Alaska. He also was in charge of construction of the St. Paul Union depot and the St. Thomas college administration building in St. Paul.

A COMPLETE ASPHALT PLANT Designed Especially for Handling Repair Work Efficiently



FLUIDOMETER
Automatic Metering System
—saves time, materials, insures accuracy and uniformity. For all types of plants.

● This portable H & B patch plant was developed to meet a long felt need for an asphalt paving plant which could produce small quantities efficiently and economically. None of the features essential to proper production and control have been sacrificed, yet all are incorporated in one self-contained unit. Material to meet any hot or cold mix specification may be manufactured with this plant. Further information on this or other H & B portable and stationary asphalt plants will be sent on request.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS 7, INDIANA

Hetherington & Berner

With the Manufacturers

Kotal Adds Sales Engineer for West Coast

To carry on its rapidly growing volume of West Coast business, Kotal Co. of Summit, N. J., has added Arthur J. Pilgerrim to its staff. Mr. Pilgerrim, formerly with the Bureau of Public Roads and the United States Engineering Department, has been active for a number of years in construction work on the West Coast



A. J. Pilgerrim

in public and private capacity. He will make his headquarters with the Smith Booth Usher Co., Kotal distributors for California, Nevada and Arizona.

Richkraft Co. to Produce and Sell Building Paper

The Richkraft Co., with offices in the Builders Bldg., Chicago, Ill., and an eastern office in Westport, Conn., has recently been

organized to market reinforced building paper, curing compound, reflecting paint, joint sealer, and kindred products for the construction industry. The firm has as its senior partner and general manager, Franklin A. Richards, who was with Sisalkraft Co. for 15 years. Mr. Richards' plan of converting rolls of paper into job-sized blankets is stated to have revolutionized the use of paper for protective purposes on highway, airport, and other construction jobs. E. M. Reynolds, formerly eastern sales manager for Sisalkraft, is junior partner and eastern manager. H. H. Deputy, who will handle sales, is a general partner, as is Grace E. Shaunessy, in charge of the inside work of the firm. The company offers Richkraft light duty, reinforced building paper to contractors and will later make available heavy duty curing paper. They are stated to effect big economies by manufacturing paper up to 10 ft. wide instead of the usual 84 in., and through their connection with one



Franklin A. Richards

of the leading mills of the country have full control of their products from pulp log to finished sheet. Another of their products is Richkure, a liquid spray curing compound which meets all A. S. T. M. standards. Included in the lines they represent are the Prismo "Life Line" traffic paints in the New York, Minnesota, Iowa, Nebraska, Montana and North Dakota territories, and the Prismo reflecting

runway markers in New York, New Jersey, Minnesota, Iowa, Montana and North Dakota. They also are agents for the "Sealz" Compounds, made by the Dispersion Process, Inc., Naugatuck Chemical Division of the United States Rubber Co., in the States of New York, New Jersey, Pennsylvania, Maryland, Delaware, Illinois, Wisconsin, Michigan, Indiana, Ohio, Kentucky and West Virginia.

The Hercules Co. Changes Hands and Name

All manufacturing and sales rights to Hercules road rollers and iron rollers, as previously made and sold



TROJAN

PERFORMANCE COUNTS

● Lower costs of doing the job and lower costs for equipment and upkeep pay you extra dividends for selecting this TROJAN UTILITY PATROL. Its superior design and construction gives you a thoroughly reliable tool that will do more work in less time. A medium weight patrol that is ideal for all but the heaviest jobs. Before you buy a patrol...get the TROJAN story and performance proofs. Address:

**CONTRACTORS
MACHINERY COMPANY, INC.
Dept. RS-44, BATAVIA, N. Y.**

*Represented by The International Harvester
Industrial Dealer in Your Community*



**TROJAN ROAD TOOLS INCLUDE: PATROLS, SELF-POWERED
SPEED TAMPERS, DRAWN TAMPING ROLLERS, SCRAPERS**

by The Hercules Co. of Marion, O., have been acquired by W. A. Riddell Corp. of Bucyrus, O. The new owners will operate under the name of The Hercules Roller Co. The Riddell organization plans to produce Hercules rollers as soon as practicable. Carl G. A. Schmidt, Jr., manager of sales for the Hercules Co., has become associated with the Riddell organization in the same capacity and will cooperate in the sale of their lines of hydraulic control motor graders, hydraulic scoops, maintainers, terracers, rotary scrapers, etc. The Hercules Roller Co. will supply replacement parts for all Hercules rollers now in

the field and expects to continue the distribution of Hercules rollers through most of the large group of distributors, at home and abroad, established by Mr. Schmidt, as well as through many Warco distributors.

Seven LeTourneau Distributors Announced

R. G. LeTourneau, Inc., Peoria, Ill., which recently announced plans to establish its own exclusive distributor organization, has already so named seven leading dealers in as many portions of the United States and Canada. Included are Loggers & Contractors

Machinery Co., Portland, Ore.; The Victor L. Phillips Co., Kansas City, Mo.; The Nicoll-Talcott Corp., Hartford, Conn.; Wylie-Stewart Machinery Co., Oklahoma City, Okla.; General Supply and Equipment Co., Inc., Baltimore, Md.; Tri-State Equipment Co., Memphis, Tenn.; and General Supply Co. of Canada, Ltd., Ottawa, Ont. All the new LeTourneau distributors have announced plans to improve and expand their organizations, and all have or are planning complete branch headquarters within their individual sales and service areas. In addition to handling LeTourneau Tournapulls, Carry-all scrapers, Dozers, Power Control Units, Tournarope, Tournaweld and other LeTourneau products, these dealers are continuing to represent other non-competitive lines for manufacturers equally prominent in their respective fields.

Cheney Appointed Advertising and Sales Promotion Manager of Macmillan Petroleum

In preparation for highly competitive postwar marketing of petroleum products, R. S. Macmillan, president of the Macmillan Petroleum Corporation, has announced the appointment of Howard W. Cheney, for the past year advertising and sales promotion manager of the Lockheed Aircraft Corporation, of Burbank, Cal.,



H. W. Cheney

to a similar position with his company effective March 1, 1944. The new petroleum official has an impressive advertising and merchandising background. He served for three years as account executive with Lord and Thomas Advertising Agency, now Foote, Cone and Belding, where he directed the advertising and merchandising activities of firms engaged in national marketing, including oil and aviation companies. Prior to that time Cheney spent five years in Europe, where he engaged in merchandising study and free-lance writing. His main activities will be directed toward the sale of Ring-Free Motor Oil, the petroleum corporation's product that has gained national distribution in a phenomenal sales campaign during the past few years. Following a three months' national tour, during which he will call upon Macmillan's district offices and distributors throughout the nation, Cheney will make his headquarters at the oil company's main office at 530 W. 6th St., Los Angeles, Calif.

IT'S NOT SO EASY— BUT EVEN IN THE DESERT, WITH THE HELP OF HERCULES CARGO BODIES, THE ARMY REPAIRS ITS EQUIPMENT



HOW MUCH EASIER IT IS FOR YOU TO KEEP YOUR EQUIPMENT IN REPAIR!

Don't neglect your Hercules Hydraulic Hoists and Bodies, or your Hercules Split-Shaft Power Take-offs.

Quick service on all Hercules parts is always maintained, and there's a Hercules Distributor with a well equipped Service Department near you.

Hercules Steel Products Co.
GALION, OHIO

Eaton Joins Perkins As Distributor

Announcement has just been made of the resignation of Thad Eaton, Assistant Treasurer, Caterpillar Tractor Co., who leaves to join in a partnership with John Perkins, "Caterpillar" distributor for Boston, Mass., and vicinity. The new partnership will operate under the name of Perkins-Eaton Machinery Co. and in the same territory as that formerly served by P. I. Perkins Company. Mr. Eaton joined the company in 1928, starting as assistant credit manager for the



V. V. Grant



Thad Eaton

Middle West territory. Succeeding Mr. Eaton in the position of Assistant Treasurer is Virgil V. Grant, who joined the company in 1936 as a member of the Cost Accounting Department shortly after graduation from the University of Illinois, Class of 1935.

Johnson Appointed Advertising Manager Willamette Hyster Co.

Dar Johnson, formerly with the Peoria, Ill., Journal-Transcript as public relations and industrial promotion manager, has been appointed sales promotion and advertising manager of the Willamette Hyster Co., Portland, Ore., and Peoria, Ill., manufacturers of heavy duty high-speed hoist equipment for use with "Caterpillar" tractors and Hyster lift and straddle trucks.



Dar Johnson

Mack Gets National Security Award

Management and employees of the Mack Manufacturing Corp. have received the War Department's National Security Award for the maintenance of "superior security and protection measures" against accidents, sabotage and possible enemy air raids. With the acceptance of the award, the Mack plant is now privileged to fly the National Security flag along with the Army-Navy star "E" banner.

Penn Sells Interest in His Detroit Company to "Jack" Frost

H. O. Penn, president of both the H. O. Penn Machinery Co. of New York and the Michigan Tractor and Machinery Co. of Detroit, has announced that his entire interest in the latter company is being sold to Mr. "Jack" Frost, who has been serving as vice-president of the Penn New York organization. The change, Mr. Penn states, will be effected as rapidly as details can be worked out. It is prompted by two major motives, the first of which is that it will relieve

Mr. Penn of the excessive burdens of management of two big machinery companies in two separate and important territories. By concentrating his attention on his New York interests, Mr. Penn will be enabled to carry out plans for expansion of his business in that territory, which by recent arrangements will include the "Caterpillar" account for the State of Connecticut, and to make further advancements in the already high quality of his service to the construction equipment trade. A second motive that has prompted Mr. Penn in making the newly announced change is that it



PROTECTS YOUR HIGHWAY INVESTMENT



A copy of this pocket-size BITUVIA Manual will be sent on request

● Neglected roads, long overdue for repairs, must receive attention during 1944 if highway investments are to be protected and essential traffic kept moving at the speed demanded by war.

BITUVIA Road Tar is particularly adapted for wartime maintenance work because it requires a minimum of equipment and man hours per mile. Other outstanding advantages of BITUVIA are its deep penetrating and firm binding qualities.

A Reilly engineer will be glad to show you how BITUVIA can be used—quickly and economically—on practically all types of maintenance and repair work.

PLASTUVIA CRACK FILLER

PLASTUVIA binds firmly with concrete and brick, and thoroughly waterproofs cracks. Does not break or chip in winter, nor "pick" in summer. Reduces crack filling costs to a new minimum.

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana
2513 S. DAMEN AVENUE, CHICAGO, ILLINOIS 500 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.
SEVENTEEN PLANTS TO SERVE YOU

opens the door of wider opportunity to Mr. Frost, who has capably served the Penn organization for 14 years and has been a vital factor in its growth to the point that it has become one of the leading distributing organizations in its field in the entire United States.

Marion Appoints New England Representative

The Marion Steam Shovel Co., Marion, O., has announced the appointment of Edward J. O'Connor as its New England representative with headquarters at the company's office

at 10 Damrell St., South Boston, Mass. Mr. O'Connor is well fitted for this position through his broad experience and engineering background. He was graduated from Massachusetts Institute of Technology in Civil Engineering and over a 20 year period has gathered considerable basic knowledge in the equipment field, including design as an engineer for both Massachusetts and Illinois State Highway Departments, as a salesman of heavy construction equipment, and for the past two years as engineer and general superintendent on airport, highway and bridge construction and gravel plant operations.

Twenty-two REASONS Why FLEX-PLANE Dummy Joints are Necessary in Modern Concrete Pavements

- Reduces the Number of Expansion Joints
- More Dummy Joints Divide Contraction Openings
- Prevents Cracking
- Retards Creeping
- Controls Warping
- Reduces Curling
- Relieves Stress
- Lessens Bumps
- Minimizes Pumping
- Minimizes Panning
- Lessens Deterioration
- Lowest Cost
- Limits Maintenance Cost
- Anchored in Place — Is Permanent
- No Extrusion
- Localizes Expansion and Contraction
- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
- Increases Strength of Slabs
- Produces Homogenous Structure
- Provides Expansion Relief for the Hot Upper Part of the Slab



FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, pre-moulded, etc., with or without VIBRATION.

• Ask for Equipment Specifications •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO
U. S. A.

ROADS AND STREETS, April, 1944

Meade New Personnel Director of Mack

Appointment of Joseph T. Meade as personnel director of Mack Manufacturing Corp. has been announced by C. T. Ruhf, president of Mack Trucks, Inc. Mr. Meade will be located in the Mack executive offices in the Empire State Building, New York, N. Y. Prior to his Mack appointment, Mr. Meade was personnel and industrial relations manager for Sheffield Farms Co., Inc., where he developed a supervisory training program. From 1935 to 1942 he was director of personnel and public relations for Canada Dry Ginger Ale, Inc., and before that an assistant trust officer with the Guaranty Trust Co. of New York, eventually assuming charge of the Mortgage Division of the Real Estate Department of Guaranty Trust.



J. T. Meade

Bohrman Promoted by Perfex

Jim Bohrman, who has directed radiator sales for Perfex Corporation, Milwaukee, Wis., has been appointed manager of the Radiator Division. Mr. Bohrman takes over his broader duties in connection with expansion of Perfex Radiator facilities, which will shortly occupy additional plant area now under construction. This is the fourth addition to the plant in three years and will increase the present floor area by 15 per cent. Mr. Bohrman formerly served in engineering capacities with Hercules Motors Corporation and Waukesha Motors Co. and has been active in the field for 18 years.

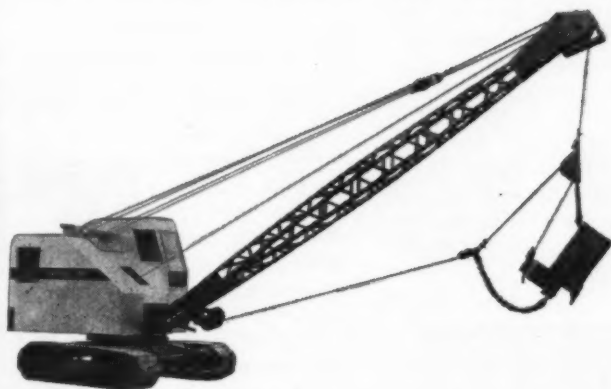


Jim Bohrman

Heil Opens New S. W. Offices

The Heil Co., Milwaukee, Wis., has announced that its Southwest Sales Representative, Howard Mann, has opened district sales offices for the company in the Irwin-Keasler Bldg., 1700 Commerce St., Dallas, Tex. The rapidly growing demand for Heil products in this territory has led to the opening of this special office. Mr. Mann will represent the company in the sale of all its lines of manufacture, including truck tanks and "trail-

HANSON CRANES



**4 and 6 Ton Capacity
Crawler or Truck Mounted**

**CONVERTIBLE TO
CRANE—DRAGLINE—CLAMSHELL
PILE DRIVER—TRENCH HOE—SHOVEL**

Full Revolving—Lattice Welded Steel Boom—Balanced Design—Low Center of Gravity—Rugged—Flexible—Heavy Industrial Type Motor, Gasoline or Diesel.

Our entire factory facilities is being used for the production of Crawler Cranes for the U. S. Navy. However, all present Hanson equipment owners are assured that any order for repairs will receive our immediate attention and shipped promptly.

THE HANSON CLUTCH & MACHINERY CO.
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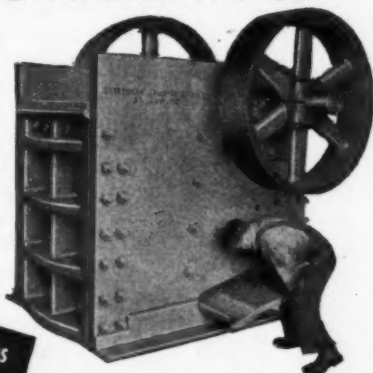
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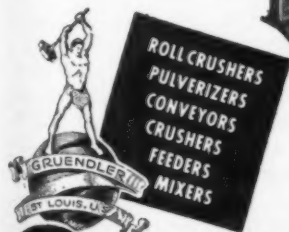
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reduced to
5" to " minus
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These heavy plate steel
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ous crushing power, take
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The complete weight of above
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Breakdowns, It's Time to
Get a Gorman-Rupp Pump**

Today, when time is the essence, you need a Gorman-Rupp Self-Priming Centrifugal Pump more than ever. There is not a quitter among them. The water passage has the same area as the suction hose. Muck, gravel, cinders—you simply can't clog them because solids cannot accumulate. There is no recirculation orifice to clog—no shut-off valve to jam—no hand priming regulator. There isn't a self-priming centrifugal pump made that will outwork a Gorman-Rupp in gallonage or continuous hours. Gas engine or electric motor driven. Capacities up to 125,000 GPH. There is a type and style to fit your every requirement. Stocked for immediate delivery in 100 principal cities.

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SELF-PRIMING CENTRIFUGAL PUMPS

erized" tanks for milk, petroleum and other liquid transportation, stationary milk tanks, truck bodies and hoists, road machinery, forage crop dehydrators, oil heating systems, and dairy and beverage bottle washers.

Mains Returns to Chicago

C. L. Schneider, Chicago Branch Manager of the Fruehauf Trailer Co., has announced the return to the Chicago branch of Ray D. Mains, Sales Manager. Mr. Mains for the past year has been handling an important assignment at Fruehauf's Washington office as special assistant to Roy A.

Fruehauf, Executive Vice president of the company.

Heads New P&H Division

Anticipating a growing demand for repair and replacement parts as a result of war production burdens on equipment, and to facilitate service to customers, a separate division for handling such business on all P&H products was recently established by Harnischfeger Corporation, Milwaukee, Wis. The new Repair Sales Division is being managed by J. D. Glatz, recently returned from Washington after two years with the WPB as

chief of the crane and hoist section in the tools division. Prior to that, he was representative for P&H in the Chicago area.

Masline Appointed General Manager

E. J. Masline, General Superintendent of The Union Metal Manufacturing Co., Canton, O., for the past 19 years, has been appointed General Manager and a Director of Pacific Union Marbelite Co., with headquarters in Los Angeles, according to an announcement by Union Metal officials. The Pacific Union Marbelite



E. J. Masline

Co. is a subsidiary of Union Metal, functioning as manufacturers and Pacific Coast sales representatives for the parent company. A. R. Miller, Electrical and Maintenance Engineer, succeeds Mr. Masline as General Superintendent. Mr. Masline has been connected with the Union Metal continuously since 1911 with the exception of 15 months in 1917-18, during which time he served with the U. S. Navy in World War I.

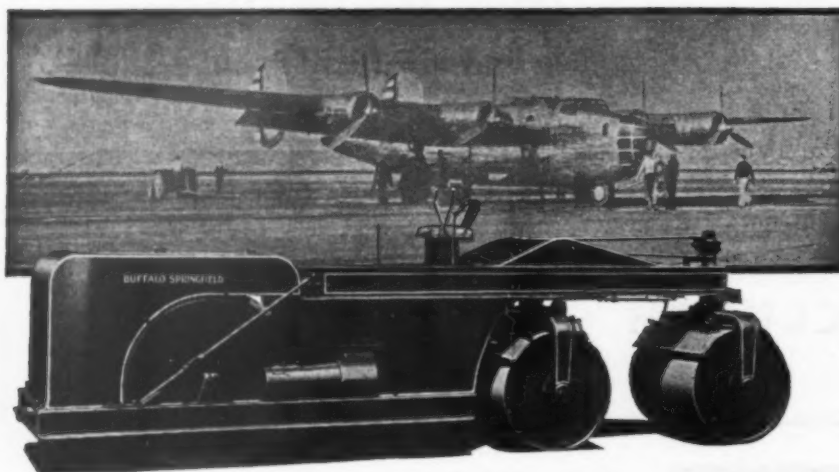
F. V. Widger, New Chairman Executive Committee, Asphalt Institute.

Frank V. Widger, manager of the Asphalt Sales Department of The Texas Co., as noted elsewhere in this section, was recently elected Chairman of the Executive Committee of The Asphalt Institute. In this added connection he is the coordinating head of the engineering and research activities of this national association

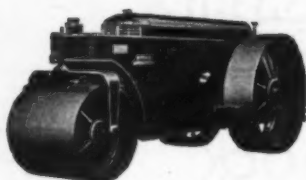


F. W. Widger

of producers of the petroleum asphalt industry. Born in Churchville, N. Y., educated in Michigan, Mr. Widger, after an earlier business career in the copper and coal mining industries, joined the Asphalt Sales Department of The Texas Co. at Chicago in 1913. He served as Manager of the Chicago District for that company from 1919 to 1937, when he was transferred to New York and made manager of the Asphalt Sales Department, his present position. Mr. Widger resides at Lynbrook, Long Island, N. Y.



VICTORY in 1944?



With American made construction machinery leveling mountainside and jungle ahead of our bombers and those bombers leveling the enemy at every contact, victory will, in due course, be ours.

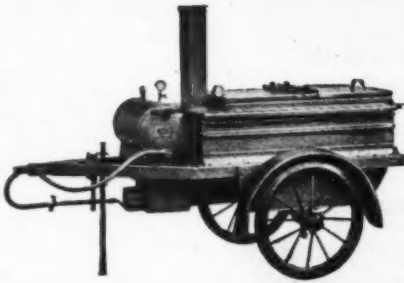
The Buffalo-Springfield organization is proud of the contribution its product is making in the service of our country.

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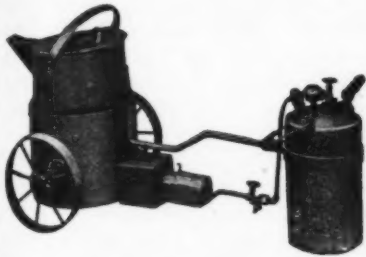
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For speedy
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tar and
asphalt—



Use this CONNERY oil-burning Patrol Patching Heater on the *small* job and this CONNERY oil-burning kettle for *large-quantity* production.



Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring pots, etc.

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3900 North Second St. Philadelphia, Pa.



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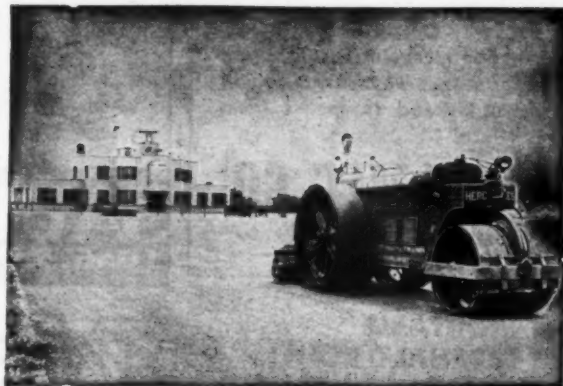
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It's up to you to protect your present Hercules with preventive maintenance. Regular frequent inspections, lubrication, cleaning, and prompt attention to needed repairs will help keep 'em rolling roads and airport runways ... till Victory. Look up your Hercules Distributor. He'll be glad to help you and so will ...

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Bucyrus, Ohio

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PORTABLE PLANT MAKES CONCRETE ON THE JOB

ERIE STEEL CONSTRUCTION CO • ERIE, PA.

Aggregators • Buckets • Concrete Plants • Traveling Cranes



• Make 20 to 40 yards of specification concrete per hour on the job. One-man operation and a helper to handle cement bags. One hour to set up. Moves from job to job. Write for booklet.

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Specialists for 50 years in manufacture of Grader Blades.

SHUNK Blades are made from special refined high carbon plow steel, rolled to our own formula. They are forged at the edges and ends to add strength and fineness to the steel. They are accurately machined, shaped and inspected to fit the machines for which they are intended. They are scientifically manufactured to withstand the severe wear to which they are subjected.

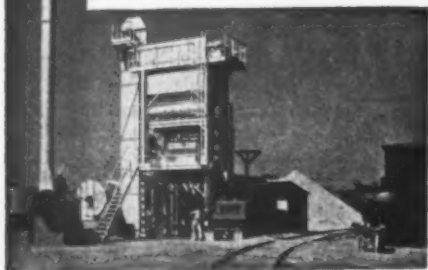
SHUNK Blades are used on 80 per cent of the Graders now in use.

Write for descriptive bulletins containing specific information on road grader and scraper blades.

SHUNK MFG. CO.

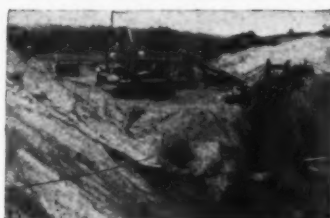
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**PORTABLE
ASPHALT PLANTS**
High Production—Low Cost



THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

ROADS AND STREETS, April, 1944



Small Sauerman Scraper moves gravel from hill to screening plant.

Move MORE yards for LESS money

ON WORK where materials have to be moved 100 to 1000 ft. or more, a Sauerman machine cuts costs by being able to dig, haul and place the material in a continuous, straight-line operation, doing away with the expense of rehandling. One man controls the entire operation.

The complete line of Sauerman scraper and cableway machines includes sizes to meet all capacity requirements. There are light, portable units for small yardage jobs and there are great powerful machines that take a 15 cu. yd. load of material at a single bite and haul this big load across the ground at a speed of 300 feet per minute.

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SAUERMAN
LONG RANGE MACHINES

NEED A BIG Trailer?

*La Crosse Makes Them
Up To 200 Ton Capacity—*
** WRITE OR WIRE **

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U.S.A.

New Trade Literature

MODEL D TOURNAPULL—A completely detailed brochure on the Le Tourneau Model D Tournapull, designed to meet the Armed Forces' demand for a prime mover small enough to stow in a transport plane but equally useful to civilian construction, has been released by R. G. Le-Tourneau, Inc., Peoria, Ill. The brochure carries a specification list and much other D Tournapull data.

PROJECTIVE HIGHWAY MAINTENANCE—A new bulletin, pointing out how calcium chloride can be used from the subsoil to the surface in maintenance operation has been issued by the Calcium Chloride Association, 4145 Penobscot Bldg., Detroit 26, Michigan. The bulletin deals with post-hole treatment of frost heaving areas as a corrective treatment for subgrades; addition of stabilized aggregates for the strengthening of base courses; conservation of surface materials through additions of binder soil and calcium chloride treatments; and widening of paved roads, with stabilized shoulders. The last part of the bulletin deals with expediting patching of concrete pavements by the use of calcium chloride in concrete mixes, for earlier strength and reopening.

HYDRAULIC TORQUE CONVERTERS—Facts concerning the function, operation and installation of "Hydraulic Torque Converters" are concisely presented in a 16-page booklet just published by the Twin

South Bend
GUTTER-SNIPE
PICK-UP STREET SWEEPERS

STREET FLUSHERS
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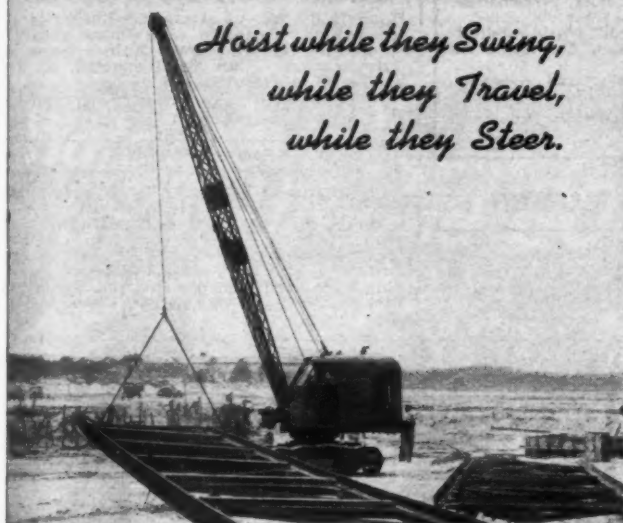
OWEN BUCKETS

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BYERS CRANES

*Hoist while they Swing,
while they Travel,
while they Steer.*



WHEN THE WAR IS WON

Byers will offer you new, improved, faster mobile cranes and shovels for peacetime jobs.

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AND
SHOVELS

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*One
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SPREADER*



**For SEAL COATING and
ICE CONTROL** with fewer men
at less cost

The FLINK Spreader

The Flink self-feeding spreader is strictly a one-man outfit. Operated by driver of cab, who can throw spreader into action as he rapidly approaches, crosses and leaves intersection. Then it can be thrown out of action. Flink spreads forward or backward, full width of street, or less than half width. Handles sand, clinders, etc., up to 1" in size, wet or dry, spreading evenly up to 35' width. Does not limit use of truck for other purposes as Flink spreader fits on and as a fall gate. Positive agitation, no bridging. Flink spreader will pay for itself many times over the first year in labor saved, in extra yardage covered and reduction of complaints.

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REPAIRS—any make.
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also buy your old in-
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FRONT END SHOVELS

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5—10,000 gal. & 12,000 gal. R.R. Car Tanks
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5— $\frac{3}{4}$ ton, 1 ton & 2 ton Asphalt Plants.
4—4x24, 5x30, 5x60 Rotary Dryers.
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In all sizes of tractor, truck, wheelbarrow,
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An EQUA-FLEX "Sectional" repair construct-
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We have pre-war quality used passenger,
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EQUIPMENT WANTED

Late Model 3-W Bucyrus-Monighan Drag-
line with Ward-Leonard control. Will pay
cash. Box 110, Roads & Streets, 330 So.
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FOR SALE OR RENT

Buckeye No. 260 Ditcher in good mechan-
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motor; 9 ft. Cat. Type Rear Tread, steel
front wheels; Cuts 108" width, 24' deep,
with extension 35' deep. Spoils dirt on
either side. Price on application. Can
be inspected at our shop in Alexandria,
La.

Buckeye No. 203 Ditcher in good mechan-
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motor; 7 ft. Cat. Type Rear Tread, steel
front wheels; Cuts 45" to 47 $\frac{1}{2}$ " width, 17'
deep, with extension 21' deep. Spoils dirt
on either side. Price on application. Can
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Buckeye Wheel type Ditcher in good me-
chanical condition. For V8 motor. Cuts
24" width, 7' deep. Price on application.
Can be inspected at our shop in Alexan-
dia, La.

Hendrix 2 $\frac{1}{2}$ cu. yd. Dragline Bucket in A1
condition, complete with dump sheaves,
spreader bar and drag chains. Price on
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Superintendent—27 years' experience in the
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Grown family. In perfect health. Avail-
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CAN'T GET 'EM UP in the morning!

It's those luxuriously comfortable
beds at all
DeWITT OPERATED HOTELS

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HOTEL HOLLANDEN

In Columbus
NEIL HOUSE

In Lancaster, O. In Corning, N. Y.
THE LANCASTER THE BARON STEUBEN

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THOS. DeWITT

PRESIDENT



Disc Clutch Co., Racine, Wisc., and Rockford, Ill.

COMPRESSORS—A new 56-page two color bulletin has been issued by the Sullivan Machinery Co., Michigan City, Ind. describing its line of heavy duty two-stage air compressors for heavy contracting, mines and industrial plants.

MOTOR GRADERS—Catalog 275 illustrating and describing Galion Motor graders has been issued recently by The Galion Iron Works & Manufacturing Co., Galion O. Various features of the machines are illustrated and described and their specifications are given. General specifications for the graders are included.

ROAD BUILDING—A new booklet, "Road Building in the U. S. A.," prepared in the interests of post-war

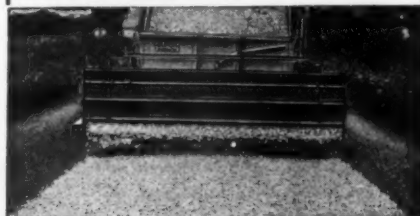
planning, has been published by E. D. Etnyre & Co., Oregon, Ill. It presents statistical data showing road construction during the past ten years—the average cost of construction per mile and the average maintenance costs. It also charts the total road mileage of U. S. A., giving unimproved, improved and surfaced mileage. It also presents a chart showing how a modern highway can be made to pay for itself in license fees and gas taxes.

SAND AND GRAVEL EQUIPMENT—Sand, gravel and ore washing and classifying equipment designed and manufactured by the Eagle Iron Works, Des Moines, Iowa, is interestingly described and illustrated in a 24-page catalog-bulletin just published by that company.

CHAIN BELTS—Chain Belt Co.,

Milwaukee, Wis. has just issued a new catalog descriptive of Rex Z-Metal chain belts for drive and conveyor service in many industries. Rex Z-Metal is a ductile ferrous cast metal with a high tensile strength and a correspondingly high yield point. Z-Metal chain belts are made in many styles, types and sizes for every kind of drive and conveyor service. In addition to Z-Metal chain belts, the Chain Belt Company also manufactures malleable iron chain belts, steel chain belts and high speed roller chain belts.

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TWICE AS
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Complete outfits on skids or wheels, capacities 30, 80, 110 and 165 gallons. Larger units can be obtained with hand sprays. Send for FREE BULLETIN No. 2405. For full information of concrete curing machines, tool and surface heaters, asphalt tools and accessories, etc. Write for FREE Catalog No. 2405.
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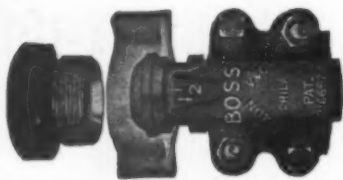
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FEMALE HOSE COUPLING

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Stocked by Manufacturers and Jobbers
of Mechanical Rubber Goods.

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Main Office and Factory: PHILADELPHIA, PA.
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ROADS AND STREETS, April, 1944

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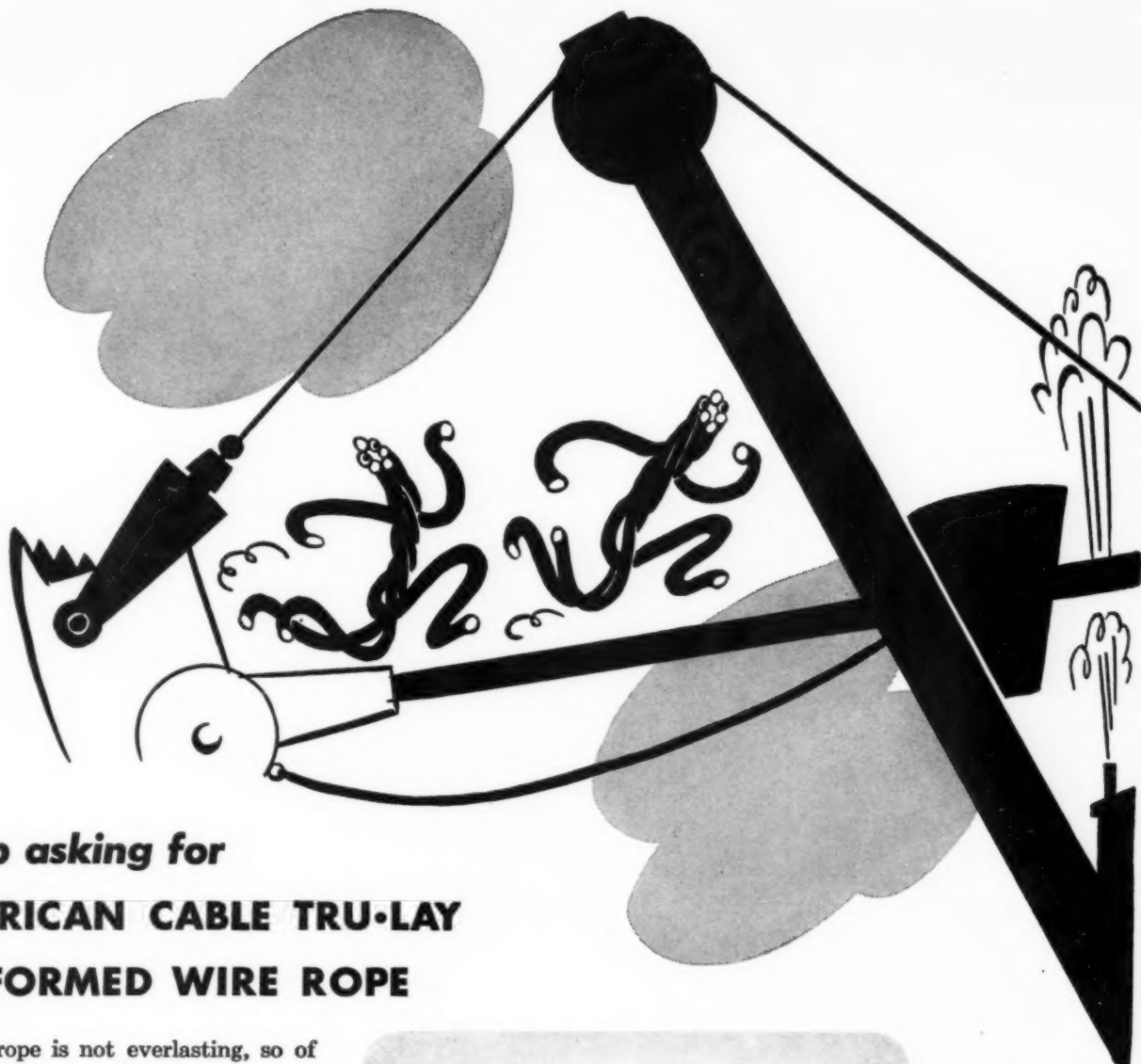
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